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ABSTRACT

Designed to provide an introduction to as many of the subject areas in Oklahoma agricultural education programs as possible, this curriculum for Grade 8 contains 15 units that highlight many career areas in agriculture. Because this course may be a student's first exposure to production agriculture subjects, the curriculum begins with basic material upon which the instructor can build and localize. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the teacher, extensions and options, information sheets, job sheets, practical tests, written tests, and answers to assignment sheets and written tests. Units of instruction are designed for use in more than one lesson or class period of instruction. Introductory materials include information on teaching basic skills and information on using the written tests as pretest and posttest. Units cover the following: introduction to agricultural industry; record keeping; agricultural communication; plants and soils; horticulture; forestry; field crop production; animal production; agricultural products and processing; agricultural power; agricultural construction; agricultural sales and service; agricultural ecology and the environment; natural resources--parks and recreation; and natural resources--wildlife and fisheries. A basic skills documentation matrix correlates skills with units of instruction. (YLB)

ED 380 620

Eighth Grade
Agricultural Orientation

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CIMC

Teacher Edition

97-009381

Oklahoma Department of
Vocational and Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074-4364

AG 1017

8th Grade Agricultural Orientation

Developed by the
Curriculum and Instructional Materials Center
for the Division of
Oklahoma Department of Vocational and Technical Education

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Curriculum and Instructional Materials Center

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TABLE OF CONTENTS

Unit I
Introduction to Agricultural Industry . . . . I - 1

Unit II
Record Keeping . . . . II - 1

Unit III
Agricultural Communication . . . . III - 1

Unit IV
Plants and Soils . . . . IV - 1

Unit V
Horticulture . . . . V - 1

Unit VI
Forestry . . . . VI - 1

Unit VII
Field Crop Production . . . . VII - 1

UNIT VIII
Animal Production . . . . VIII - 1

Unit IX
Agricultural Products and Processing . . . . IX - 1

Unit X
Agricultural Power . . . . X - 1

Unit XI
Agricultural Construction . . . . XI - 1

Unit XII
Agricultural Sales and Service . . . . XII - 1

Unit XIII
Agricultural Ecology and the Environment . . . . XIII - 1

Unit XIV
Natural Resources-Parks and Recreation . . . . XIV -1

Unit XV
Natural Resources-Wildlife and Fisheries . . . . XV - 1

FOREWORD

The Oklahoma Department of Vocational and Technical Education is committed to excellence and quality in education. This commitment is seen in the quality services offered to the students of Oklahoma. The agricultural education programs offered through the Oklahoma Department of Vocational and Technical Education are an example of excellence in action.

Oklahoma has a strong agricultural base and must have competent, qualified workers to stay that way. By introducing young people to the vast opportunities found in agriculture, we can assist them in selecting a pathway to the future.

The youth of today will soon be the leaders of tomorrow. The eighth grade agriculture curriculum introduces these young leaders to the wide variety of technologies and fields found in agriculture. This curriculum gives the student a comprehensive overview of the world of agriculture.

This publication provides valuable information, activities, and competencies for students wishing to explore the world of agriculture–for today and tomorrow.

Eddie Smith, State Supervisor
Agricultural Education
Oklahoma Department of Vocational
and Technical Education

PREFACE

Eighth Grade Agricultural Orientation contains fifteen units which highlight many of the career areas in agriculture. Oklahoma agricultural education programs offer excellent opportunities in many subject and enterprise areas. This publication was designed to provide an introduction to as many of those subject areas as possible.

Since this course may be a student's first exposure to production agriculture subjects, the curriculum begins with basic material upon which the instructor can build and localize. Many students will have been raised on the family farm and will be no stranger to farming or ranching operations. However, many will not have had the opportunity to learn about the agricultural applications and career opportunities in such subjects as sales and service, communications, or record keeping.

Three units on environmental subjects are included in this text. The importance of environmental awareness cannot be overlooked in any curriculum that deals with the use of land and other resources. Those who have made their living from the land have long understood the importance of good conservation practices. However, it is vitally important that all citizens feel a sense of community with the living and nonliving things around them.

Finally, it is hoped that by providing this broad array of material, a student will perhaps become inspired to learn more about a particular subject or will at least gain an understanding of the importance of agriculture in all our lives.

Randy Kirk, Curriculum Specialist
Curriculum and Instructional
Materials Center

ACKNOWLEDGEMENTS

Developing a publication requires teamwork, individual effort, and the support of many behind-the-scenes people. Recognizing them on these pages is only a small way to say thank you.

The committee responsible for determining content and technical accuracy took a number of days out of their schedules to meet in Stillwater and answered countless questions over the phone. My sincere appreciation goes to these committee members:

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All of the illustrators in the Art Department had a hand in creating the drawings, graphs, transparency masters, and other artwork. My thanks to Bob Davis and all of the Art Department.

At the Curriculum and Instructional Materials Center, for their hard work and support, I would like to express my appreciation to:

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I would also like to thank the two excellent editors who spent many hours working on this project and whose contributions were essential. Thank you to Les Kauer and Ann Johnston.

Special recognition goes to Claire Dickey, CIMC technical writer for her attention to detail, editing skills, and the long hours she spent on this project.

This publication was written by Vicky L. Elias and Sandra Dutreau Perky Williams, publications contractor, Stillwater, Oklahoma. It is a reflection of their experience in research and their imagination in creating activities that are interesting and worthwhile.

Randy Kirk, Curriculum Specialist
Curriculum and Instructional
Materials Center

USE OF THIS PUBLICATION

INSTRUCTIONAL UNIT

8th Grade Agriculture contains fifteen units. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the teacher, extensions and options, information sheets, job sheets, practical tests, written tests, and answers to assignment sheets, and written test all of which are included in the instructor edition. The student workbook includes the objective sheets, information sheets, supplements, activity sheets, assignment sheets, and job sheets. Pretest, practical tests, and written tests may be duplicated for classroom use or additional copies may be purchased by calling 1-800-654-4502, in Oklahoma 1-800-522-5810, ext. 589.

All of the unit components "zero in" on measurable and observable learning outcomes. Instructors are encouraged to supplement, personalize, localize, and motivate with these materials to develop a complete teaching/learning process.

Units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the instructor will help him or her determine the following:

- Amount of material that can be covered in each class period.
- Skills that must be demonstrated.
  - Supplies and equipment needed
  - Amount of class time needed for demonstrations
  - Amount of time needed for student practice
- Supplementary materials, including print and non-print media, that must be ordered.
- Resource people who must be contacted.

Objective Sheet (white pages)

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction, and specific objectives stating the performance necessary to reach the unit objective.

The unit objective states the overall goal of the unit. It tells what the student should be able to do and what standard will be used to see whether the student can do it. Specific objectives outline the teaching sequence of the competencies required to meet the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objective can also help determine teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective can be best taught.

Instructors should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the instructor should remember to supply the needed information, assignment and/or job sheets, and criterion test items.

Suggested Activities (pink pages) – **Instructor's Edition only**

This component is included only in instructor material. The suggested activities page assists the instructor during the preparation stage of the teaching/learning process by providing suggestions for delivery, application, and evaluation during the instructional process. The instructor should read the suggested activities before teaching the units to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the instructor will vary according to the particular unit.

References used in the development of each unit are listed in the "Suggested Resources" section, along with print and non-print media that may be used to teach the unit. These materials can be used by the instructor to supplement his or her knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Pretest Answers (pink pages) – **Instructors Edition only**

The answers to the pretest are given in this component only to the teacher.

Pretests (yellow pages) – **Instructor's Edition only**

This component provides a pre-assessment of the knowledge that a student possesses prior to instruction. In individualized instruction, a student may challenge out of studying some or all of the cognitive objectives. In a group instructional setting, instructors may evaluate the knowledge that a group of students bring with them and determine where instruction should be emphasized.

Information Sheets (green pages)

The information sheet provides "must know" content essential for meeting the cognitive objectives on the knowledge and comprehension level of Bloom's taxonomy of educational objectives. The information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. It also may be used for coordination activities and advisory committees.

Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and instructors to ad notes that supplement, localize, personalize, or provide motivation for each unit.

The information sheet may include notes, cautions, or warnings. These should be discussed carefully and thoroughly. Notes are short verbal additions to the information sheet or procedural outline that provide nice-to-know and decision-making information. A note may tell the student what to watch for or to consider at a given step. It may explain when a step may not be applicable. Notes offer guidance that may help the student understand the process and do it more efficiently. **Cautions** are advisories that tell the student how to avoid causing minor personal injury or equipment damage. **Warnings** are advisories that tell the student to avoid serious personal injury or death to the student persons in the workplace, or users of the project or the procedure.

Supplements (green pages)

Supplements include instructions that could be used for solving problems or reinforcing the enrichment of learning. The information presented in a supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment or job sheets. While supplements are not tested over directly, they may be used to assist in meeting the performance objectives.

Assignment sheets are intended to provide students with practice in exercising higher-order thinking skills. Often, assignment sheets will contain case studies or story problems or other situations in which the student must analyze the circumstances and determine correct responses. Assignment sheets may be given to the students for completion in class or for homework. Answer sheets are provided.

Transparency Masters (white pates)

Transparency masters provide information in a special way. The students may see as well as her the materials being presented, this reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information or assignment sheets.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Activity Sheets (tan pages)

The purpose of activity sheets is to provide activities which support several objectives. Activity sheets vary greatly in their number and design from unit to unit. Some activity sheets deal with the student's attitudes and beliefs. These may ask rather personal questions and are only intended for each student's personal use. Some activity sheets may require the student to monitor his or her own actions or other personal variables over a period of time. Answer sheets may or may not be included. Activity sheet answers are on pink pages in the instructor's edition.

Assignment Sheets (tan pages)

Assignment sheets provide students with information and exercises to problems that address learning levels at or above the application level of Bloom's taxonomy. Assignment sheets provide written exercises for instruction and practice of a specific objective. The introduction to the assignment sheet explains how the assignment sheet relates to the subject area and unit objectives and may provide instructional information or refer students to another component for such information.

Job Sheets (blue pages)

Job sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure to complete each task or job. Diagrams, photographs, and illustration are provided to assist students in achieving the skill.

The instructor should demonstrate the procedure outlines in each job sheet. Further more, the instructor needs to localize the procedure according to the equipment and supplies available in the local lab or shop situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Practical Tests (yellow pages) – **Instructor's Edition only**

The practical tests are designed to assist the instructor in the evaluation of the psychomotor activities (job sheets). The practical test provides instructors with a valid mechanism for determining a student's level of ability in performing the procedure stated on the job sheet.

Written Test (yellow pages) – **Instructor's Edition only**

This component provides criterion-references evaluation of every objective listed in the unit of instruction. It is crucial to note that both paper-pencil and performance objectives must be evaluated. If objectives have been added, deleted, and modified, appropriate changes should be made on the test.

The test may be written or oral. It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered.

The acceptable response on a unit test, eighty-five (85) percent in most units, may be raised or lowered to fit the topic or students' ability levels. The percentage applies to the overall score, not to each individual question. The final unit grade should be obtained by using the "paper-pencil" score along with teacher evaluations of student demonstrations of the desired skills.

Answers to Assignment Sheets and Written Tests (pink pages) – **Instructor's Edition only**

These components are designed to assist the instructor in evaluation of student performance. They are available in the teacher's edition only.

PAGE NUMBERING

Each publication for the Curriculum and Instructional Materials Center is usually assigned a specific abbreviation. ***8th Grade Agriculture*** has not been abbreviated. Each unit will be recognized by the unit number in roman numerals. Each unit in the publication begins with page 1. Each page number gives the component name, book title, unit number, and page number within the unit. Since CIMC publications are loose-leaf, this system of page numbering was recently adopted so that pages from different manuals would not get mixed up. The page number for the objective sheet in **Introduction to Agricultural Industry**, which is unit I, would look like this:

OBJECTIVE SHEET · 8th Grade Agriculture
CIMC I · 1

METHODS OF DISSEMINATING MATERIAL

For best results, provide student materials for each student. Student workbooks contain objective sheets, information sheets, supplements, transparency masters, activity sheets, assignment sheets, and job sheets. Pretest, practical tests, and written tests are packaged separately for students, and can be stored until needed. Students should be allowed to take their materials home at the end of the course.

TEACHING METHODS

Keeping students motivated is a challenge. Supplement the objectives by providing the "why," personal experiences, and current information. If you are going to teach the material in a group setting, prepare for the unit be deciding the best way to teach each objective and allow for student input.

If you are going to follow the plan for individualized instruction, provide opportunities that will allow each student to become involved in planning for and being responsible for his or her own education.

COMPETENCY PROFILES

A competency profile is available for each CIMC publication. Competency profiles document student performance. The profile contains a list of the specific job competencies that a student should achieve before leaving the training program. Profiles should be distributed as required.

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and to indicate the correction on the copy. Mail this information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

BASIC SKILLS IN CURRICULUM

Since its inception in 1969, the Curriculum and Instructional Materials Center (CIMC) of the Oklahoma Department of Vocational and Technical Education has provided quality, competency-based instructional materials for vocational training programs. During this time, the CIMC has been mindful of the importance of reinforcement (and sometimes remediation) of students' academic skills as they progress through vocational training, and has always included activities in its materials to enhance and promote use of these skills.

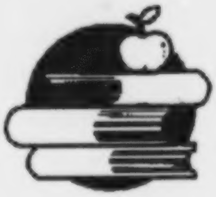
In response to changing job requirements, federal and state legislatures are enacting laws setting stringent basic skills requirements for nonvocational **and** vocational education. State legislatures are increasing basic skills accountability for teachers and school administrators. The recently enacted Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 (P.L. 101-392) mandates academic skills development in vocational training. In addition, business and industry are delivering the message clearly to educators that vocational competence now requires increased strength in the basic skills.

As noted earlier, it is not new for CIMC materials to contain information and activities that develop basic skills competencies in students taking vocational training. What **is** new is the documentation or flagging of basic skills in CIMC materials, and further enhancement of basic skills activities. To accomplish this, the CIMC has developed a "Five Point Approach to the Integration of Basic Skills into the Curriculum." Following is a brief description of this process.

I. Basic Skills Icons

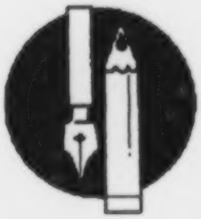
To assist teachers and students in identifying activities that promote basic skills development, the CIMC has implemented a marking system that uses simple graphic symbols, or icons, to denote which of nine general basic skill categories is being emphasized. These icons are located in the left margins of assignment, activity, and job sheets. The nine basic skill areas are as follows:

Reading Skills



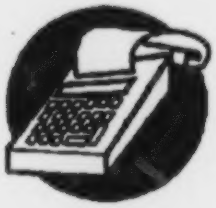
The activities identified by this icon deal specifically with developing reading skills in an applied, job-related context. These range from general information-gathering activities to tasks requiring use of specific technical reference materials.

Writing Skills

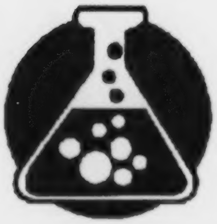


Tasks identified with this icon promote development of skills in written communication ranging in complexity from filling out forms to the written expression of ideas and concepts related to vocational exploration or performance.

Mathematics Skills



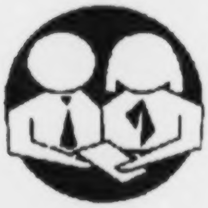
This icon identifies activities that develop vocationally related skills in computation; measurement and estimation; selection and application of appropriate mathematical process; and collecting, displaying, or interpreting data.



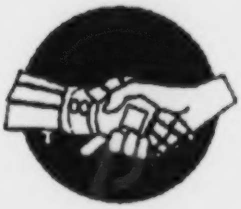
Science Skills

The science icon marks activities that are related to the development of skills in either the physical or biological sciences. These skills stress occupationally related applications of science and technology.

Oral Communication Skills



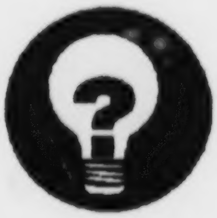
This icon identifies activities that promote development of effective speaking and listening skills. They include practice in such areas as speaking techniques, word choice, nonverbal messages, use of communication media, and using active listening techniques.



Interpersonal or Relating Skills

Activities that deal directly with skills in relating to others are marked with this icon. This includes areas such as group processes and dynamics, negotiation, dealing with conflict, and leadership/motivation.

Creative Thinking and Problem Solving Skills



This icon identifies activities that stress development of higher-order thought processes such as problem identification and analysis, lateral thinking, evaluating alternatives/outcomes, and developing solutions.

Employability Skills

Activities marked with this icon relate to competencies required to obtain employment and develop a career. These competencies include specific occupational tasks and more general items such as career planning, job search, business etiquette, and maturing in one's work environment.

Social Studies Skills

This icon is used to identify activities that stress competencies in fields relating to human society and its distribution and relationships. This includes all the social sciences such as history, economics, geography, demographics, current events, cross-cultural studies, consumer issues, environmental issues, and ethical concerns in science and technology.

Some activities in the CIMC materials develop skills in more than one of the nine basic skill areas. In cases where the relative strengths of the skill elements are clearly discernable, the icon used is the one judged to be the primary, or the most heavily emphasized, activity. When there is no clear-cut difference between importance of skill area, multiple icons are used.

II. Enablers

Once the **general** basic skill activity has been identified by an icon, the CIMC takes the process one step further by indicating the **specific** skills that are addressed in an activity. This is accomplished by using enabling skills, or "enablers."

Lists of enablers, or specific skills required for each activity, have been developed at CIMC for each of the nine basic skills areas. The enablers have been grouped into sets of related skills under each icon. The list of general skill categories under each icon is as follows:

Reading Comprehension Skills
Research and Reference Skills
Functional Reading Skills

Language Skills
Composition Skills
Research Skills
Functional Writing Skills

Operation and Calculation Skills
Math Application Skills
Data Analysis and Display Skills
Functional Math Skills

General Science Skills
Life Science Skills
Physical Science Skills
Earth Science Skills

Oral Presentation Skills
Listening Skills
Interactive Communication Skills

General Relating Skills
Teamwork/Cooperative Skills
Leadership/Influencing Skills

Enablers
Cognitive Activities Skills

Job Search/Selection Skills
Job Acquisition/Development Skills

Information Analysis Skills
Social Studies Application Skills
Functional Social Studies Skills

Applicable enablers, grouped under their general categories, are listed beneath each icon in the left-hand margin of the activity, assignment, and job sheets. For example, an exercise that requires a student to conduct library research would make necessary the use of specific reading comprehension and research and references skills. The basic skills that the exercise is promoting would be depicted in the margin as follows:

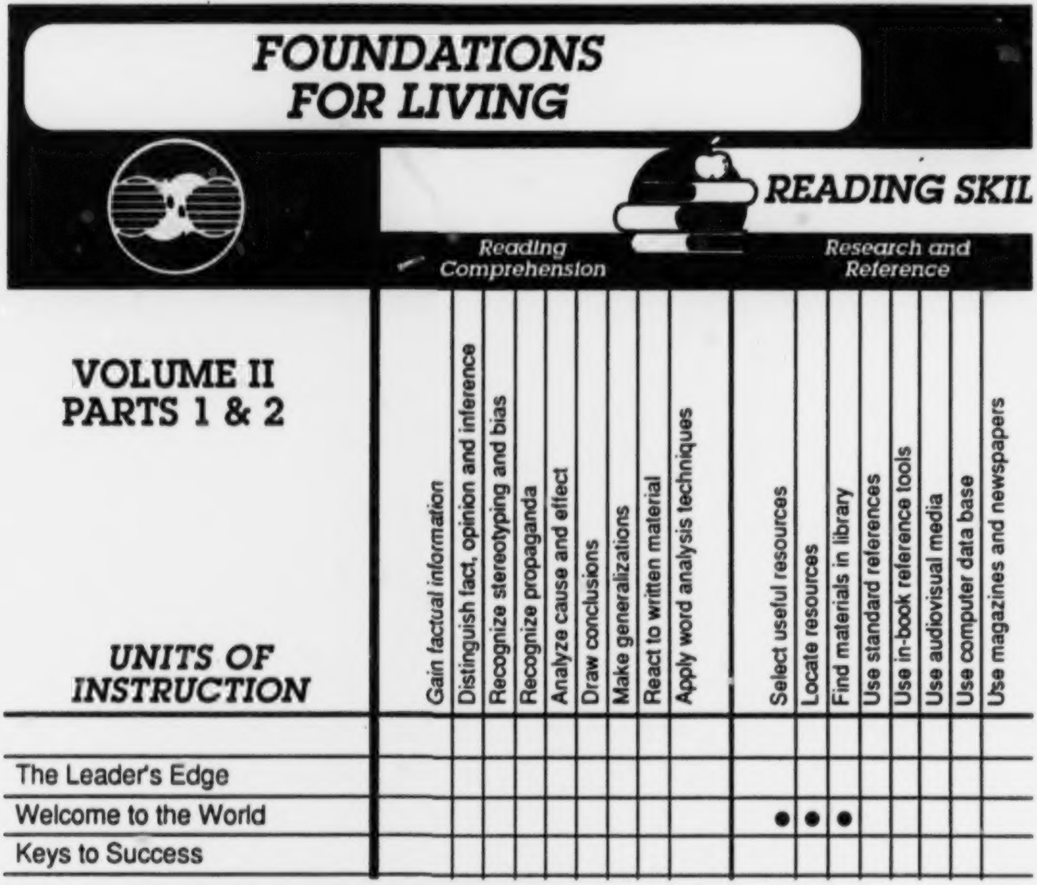
Reading Comprehension Skills
- Gain information

Research and Reference Skills
- Select useful resources
- Find materials in library

[Text]

III. Basic Skills Documentation Matrix

The third component of the CIMC basic skills instructional plan is the "Basic Skills Documentation Matrix." This attractive 22" x 34" wall hanging graphically depicts the basic skills in a CIMC curriculum guide unit by unit. It should be helpful to teachers in planning their instruction, and to administrators as documentation that basic skills **are** being addressed during the vocational training. Two copies of the matrix are included with each order of a teacher's book.



FOUNDATIONS FOR LIVING

READING SKIL

VOLUME II PARTS 1 & 2

UNITS OF INSTRUCTION	Reading Comprehension: Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques	Research and Reference: Select useful resources	Locate resources	Find materials in library	Use standard references	Use in-book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers
The Leader's Edge																	
Welcome to the World										●	●	●					
Keys to Success																	

Matrices have been developed for most CIMC publications. For more information on those available for other programs, call CIMC Resale, 1-800-522-5810 Ext. 589 in Oklahoma, and 1-800-654-4502 in all other states.

IV. Suggested Evaluative Criteria

In some instances a "Suggested Evaluative Criteria" chart is included on assignment sheets to assist the teacher in scoring the basic skills portion of the assignment. As the title implies, these are suggestions only, and should be of use to the vocational teacher who has little experience or training in teaching or evaluating academic exercises such as composition writing. The criteria will usually appear with writing, oral presentation, or major project assignments. For example, suggested evaluative criteria given for a writing assignment would recommend number of points to be assigned for neatness of report, content, use of note cards, spelling, and grammar.

SUGGESTED
EVALUATIVE CRITERIA

1.	Note cards with proper information	10 points
2.	Bibliography	5 points
3.	Footnotes	5 points
4.	Language skills (grammar, spelling, capitalization, punctuation, complete sentences)	15 points
5.	Composition skills (topic sentences, introductory paragraph)	15 points
6.	Content	45 points
7.	Neatness of report	5 points
	TOTAL	100 points

V. Instructional Supplement

When appropriate, a "Basic Skills Instructional Supplement" is appended directly behind assignment, activity, or job sheets in the teacher's book. This supplement is a tool for the instructor to use in helping students apply the basic skills in their assignments. Some supplements are appropriate for use with all students; some are for use only with those students who do not understand the academic skills called for in the exercise. The supplement will be similar in format to the Suggested Activities portion of the CIMC materials.

BASIC SKILLS	***USE AUTOMOTIVE SERVICE REFERENCE MATERIALS*** ***I***
INSTRUCTIONAL SUPPLEMENT	Skill development for: MATHEMATICS ● Introduce the assignment to the students by discussing with them the purpose of graphs. Stress the ability of graphs to represent numerical data in easy-to-read, visual format. ● Use Student Supplement 3, "Interpreting Graphs," to review with students the major types of graphs and how they should be read.

******

The five basic skills components:

- Icons
  - Enablers
    - Matrix
      - Suggested Evaluative Criteria
        - Basic Skills Instructional Supplements

are currently being phased into CIMC publications in graduated stages. While not all publications presently contain all five components, missing components will be added as books are revised and reprinted.

Lynna Ausburn, Ph.D. Development Coordinator	Billie Frazier Copy Specialist

USING THE CIMC WRITTEN TESTS AS PRETEST AND POSTTEST TO MEASURE STUDENT PERFORMANCE GAINS

When you examine this book, you will notice that separate written pretests are no longer included in the units of instruction. Each CIMC unit now contains only a single written test. This test can be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

DOCUMENTING STUDENT PERFORMANCE GAINS

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. The new CIMC unit tests and the instructions given here for pretest/posttest analysis are designed to help teachers keep accurate performance gains data with minimum effort.

WHY SHOULD BOTH A PRETEST AND A POSTTEST BE USED, AND WHY SHOULD THEY BE THE SAME?

It is only possible to calculate a **gain** in performance if competencies are tested **both** before and after training. The use of a pretest and a posttest gives the required "before and after" information, allowing accurate comparison of student performance before and after completing a program of instruction.

Without pretest data, it is impossible to determine how well students could have met the objectives of a program without the benefit of any instruction. It would therefore be quite possible to incorrectly interpret good student performance on a posttest as gains in ability and knowledge produced by a good instructional program when, in fact, the posttest strength might be due merely to prior knowledge on the part of students. This erroneous conclusion is avoided by use of both pretest and posttest data.

If students cannot meet the objectives of a program prior to instruction but can meet them afterward, the conclusions that performance gain has been made, and made as a result of instruction, are much more likely to be accurate.

In order to provide data which can be precisely compared, the pretest and posttest **must be identical**. This is why CIMC materials have only one test for each unit. This test is intended to be used as both pretest and posttest.

After giving the written test to all students both before and after you present a unit, you will be ready to make the calculations needed for your analysis of your students' performance gains on the unit. There are two techniques you should use for this analysis.

ANALYZING PERFORMANCE GAINS FOR GROUPS OF STUDENTS

The first step to measuring student performance gains on a unit is to examine the gains made by an **entire class or other group**.

The simplest technique for showing posttest gains for a group is to calculate **pass rates** on the unit test. Pass rates are very easy to calculate, and require a minimum of computation.

Pass rates are simple percentages; specifically, the percentage of students who answered each test question correctly.

Matching Test Questions to Objectives

To determine pass rates, the first step is to match each question on the test to a specific objective. This is easy with CIMC instructional materials, because they have clearly specified objectives.

As an example of matching test questions to objectives, look at the chart below. Here, a teacher has decided that test questions 1 and 4 test objective number 1; question 3 tests objective number 2; and test question number 2 tests objective number 3.

OBJECTIVE NUMBER	TEST QUESTION NUMBER
1	1
1	4
2	3
3	2

Calculating Pass Rates

After you have carefully cross-matched test questions and objectives, you are ready to proceed with the calculation of pass rates. You will determine a pass rate for **each test question**. Calculate pass rates with this simple formula:

$$\frac{\text{Number of students who passed the question}}{\text{Number of students in group}} \times 100 = \begin{array}{l}\textbf{Pass Rate}\\ \text{(\% of the}\\ \text{group that}\\ \text{passed the}\\ \text{question)}\end{array}$$

Keep in mind that pass rates examine the performance of a **group**. They do **not** provide information about individual students.

Using a Pass Rate Chart

The best way to record, display, and analyze pass rates is in a **Pass Rate Chart**. The chart puts all data in uniform and easily read format and simplifies data analysis. The chart should include pass rates for the group on both pretest and posttest for all test questions, and should indicate which specific questions relate to each objective. It should also show pass rates for the entire test as a whole.

Completing a Pass Rate Chart

Below is an example of a Pass Rate Chart.

PASS RATE CHART

OBJECTIVE NUMBER	TEST QUESTION NUMBER	PRETEST PASS RATE	POSTTEST PASS RATE
1	1	0%	100%
1	4	2%	82%
2	3	0%	60%
3	2	4%	92%
TOTAL TEST RATES		100-90% 0% 89-80% 0% 79-70% 0% 69-60% 0% 59-50% 0% 49- 0% 99%	100-90% 60% 89-80% 20% 79-70% 10% 69-60% 5% 59-50% 5% 49-0% 0%

By looking at the figures on the chart, you can easily see how great a difference in performance there is for the class before and after instruction. You can also see which specific objectives and/or test questions caused problems for students. The differences between pretest and posttest pass rates represent performance gains for the group of students.

To complete a Pass Rate Chart, you need to go through a simple sequence of steps and record the information on the chart. A blank Pass Rate Chart is presented on page 11. You may duplicate this chart for your personal use.

To complete a Pass Rate Chart for a CIMC unit of instruction, go through the following steps:

1. Match the test questions on the written test to specific objectives, and fill in the first two columns on the left. These columns are labeled "Objective Number" and "Test Question Number." Some objectives may have more than one test question matched to them.

2. Give the CIMC written test as a pretest, then calculate the pass rate for each test question, using the formula given on page 4. Record the pass rate for each test question in the "Pretest Pass Rate" column.

EXAMPLE:

In a class of 26 students, 3 students got a question correct. Pass rate for the question = (3 ÷ 26) X 100, or 11.5%.

3. Calculate the total test pass rates for the pretest and fill in these rates at the bottom of the "Pretest Pass Rate" column. Do this as follows:

   a. Calculate the percentage score made by each student on the pretest, using this formula:

$$\frac{\text{Number of points scored by student}}{\text{Number of points on the test}} \times 100 = \text{Percentage Score}$$

EXAMPLE:

A student earns 6 points out of a total of 75 possible on the test. The student's percentage score is (6 ÷ 75) X 100, or 8%.

b. Determine how many students earned percentage scores in each of the following score ranges:

100-90%
89-80%
79-70%
69-60%
59-50%
40-0%

c. Change the **number** of students in each score range into a **percent** of the total group, using the following formula:

$$\frac{\text{Number of students who scored in an interval}}{\text{Total number of students in group}} \quad \text{X } 100$$

EXAMPLE:

In a group of 32 students, 12 students scored in the interval of 59-50%. The percent of students who scored in this interval is (12 ÷ 32) X 100, or 37.5%.

4. Give the CIMC written test again as a posttest, then repeat steps 2 and 3 above. Fill in the appropriate figures in the "Posttest Pass Rate" column for each test question, and for the total test rates.

ANALYZING PERFORMANCE GAINS FOR INDIVIDUAL STUDENTS

After completing the Pass Rate Chart to analyze the performance gains for an **entire group** of students on a test, it is a good idea to calculate a measure of performance gains for **each individual** student. A simple and accurate way to do this is to calculate a **modified percentage gain score** for each student.

The modified percentage gain score for each student should be recorded in a **Modified Gain Record Chart**. This chart makes an easy reference for evaluating the gain performance of each student. A blank Modified Gain Record Chart appears on page 12. You may duplicate this chart for your personal use.

Calculating Modified Percentage Gain Scores

Modified percentage gain scores can be calculated at the top of each student's test paper. Calculate gain scores as follows:

1. Calculate the student's **Pretest Percentage**, or the percentage score the student made on the pretest. Use this formula:

$$\frac{\text{Number of points scored by student}}{\text{Number of points on the test}} \quad \text{X } 100$$

2. Subtract this percentage from 100%. The resulting figure is the **Percentage Available** to the student for improvement on the posttest.

3. Calculate the **Posttest Percentage**, or percentage score the student made on the posttest, using the formula given in step 1.

4. Subtract the **Pretest Percentage** from the **Posttest Percentage**. This figure is the **Percentage Gained** on the posttest.

5. Divide the **Percentage Gained** (step 4) by the **Percentage Available** for gain (step 2). This figure is the ***MODIFIED PERCENTAGE GAIN***. It shows what portion of the increase that was **possible** after the pretest was **actually gained** by the student on the posttest.

EXAMPLE:

As an example of the calculation of modified percentage gain scores, suppose a student made 10% on the pretest and 90% on the posttest. The calculation would be as follows:

1. The **Pretest Percentage** score of 10% was determined using the percentage formula given in step 1 on page 8.

2. **Percentage Available** to the student for improvement on the posttest:

100%
- 10% **(Pretest Percentage)**
90% **(Percentage Available)**

3. The **Posttest Percentage** of 90% was determined using the percentage formula.

4. **Percentage Gained** on the posttest:

90% **(Posttest Percentage)**
- 10% **(Pretest Percentage)**
80% (**Percentage Gained** on posttest)

5. The **MODIFIED PERCENTAGE GAIN** score:

80% **(Percentage Gained)** ÷ 90% **(Percentage Available)** X 100 = 89%

This student made a modified gain score of 89%. That means that the student earned 89% of the improvement that was possible for him/her on the posttest, based on his/her pretest score.

Using a Modified Gain Record Chart

A modified percentage gain score should be calculated for each student on each unit test. Enter the gain scores on a Modified Gains Record Chart like the one that is on page 12. (Copy this form for your own use.) By using these forms, you can easily check through the gain scores and analyze the performance gains made by your students on each unit of instruction.

If most students have made good performance gains from your instructional program, there will be a large number of high modified gain scores. This would indicate that your students are gaining from your program **most** of what they did not know before they received instruction.

****

You know how to verify gains in performance on CIMC unit tests, both for groups of students and for individual students. The procedures you have learned are based on:

- giving **pretests and posttests** which are identical
- calculating and analyzing **group pass rates** for learning objectives, for individual test questions, and for entire unit tests (Complete a Pass Rate Chart for each unit)
- calculating and analyzing **students' modified percentage gain scores** to determine their individual performance improvement (Complete a Modified Gain Record Chart for each unit)

By using these basic procedures you will gain accurate and objective information about what specific skills your students are mastering and how much they are improving as they proceed through your program. This information will be very valuable in documenting your students' achievement gains, and in increasing accountability to students, parents, administrators, and government.

PASS RATE CHART

CLASS ______________________________

TEST/UNIT TITLE ______________________________

TEST DATE ______________________________

OBJECTIVE NUMBER	TEST QUESTION NUMBER	PRETEST PASS RATE	POSTTEST PASS RATE
TOTAL TEST PASS RATES		100-90% ___% 89-80% ___% 79-70% ___% 69-60% ___% 59-50% ___% 49-0% ___%	100-90% ___% 89-80% ___% 79-70% ___% 69-60% ___% 59-50% ___% 49-0% ___%

May be reproduced for teacher/evaluator use.

MODIFIED GAIN RECORD CHART

CLASS ____________________

TEST/UNIT TITLE ____________________

TEST DATE ____________________

STUDENT'S NAME	PRETEST PERCENTAGE	POSTTEST PERCENTAGE	MODIFIED PERCENTAGE GAIN

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OBJECTIVE SHEET

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

INTRODUCTION

Agriculture. What do you think of when you hear that word? Farming, livestock, wide open spaces, powerful tractors? Agriculture is all that and much more. It is more, in fact, than you can probably imagine.

Take, for example, one single product–a bale of cotton. That bale of cotton represents not only the people who grow cotton, but people who make equipment and who labor to plant, harvest, and bale it, and ship it to cloth manufacturers around the world. The cotton fabric goes to dyers who give it color and patterns, to fabric stores and to manufacturers of clothing, furniture, sports equipment, packaging and other products, employing millions of people and making our lives more comfortable and our work more efficient.

And still, that bale of cotton represents more than the people who grow it, use it, and profit by it. This simple plant affects national and foreign economies and their relationships. Cotton is now and has been since earliest times, a major factor in trade and economic balance. The Civil War was fought over the right of Southern agrarian states to own slaves and secede from the industrialized Northern states. The slave trade enabled cotton (as well as sugar and tobacco) growers to cultivate thousands of acres and amass vast fortunes.

Cotton made Oklahoma and other southern states important to the national economy. In the Great Depression of 1929, complicated by the 10-year drought called the Dust Bowl, the price of cotton dropped to 4¢ a pound, less than the cost of production, forcing farmers to lose their farms and leave Oklahoma. The government sponsored conservation programs to assist farmers, improve farming, and help bring an end to the Great Depression.

Oklahoma recovered and in 1990 produced over 380,000 bales of cotton, and U. S. production exceeded 15 million bales.

Outside the U. S., cotton production technology, mainly new machinery and irrigation methods, have enabled Egyptian and Israeli farmers to grow cotton in desert country.

Because food, clothing, and shelter, the most basic requirements for human life and livestock come from agriculture, it is the single most important factor in the health and economy of states, nations, and all peoples.

UNIT OBJECTIVE

After completing this unit, the student will be able to discuss the importance of agriculture, the economic impact of agriculture, and how the past and future will be affected by agriculture. The student will demonstrate these competencies by completing assignment sheets and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with agricultural industry to their definitions.
2. Select from a list true statements about how agriculture relates to the everyday person.
3. Choose the word or phrase that completes statements about how agriculture has affected history.
4. Select from a list true statements about agriculture and the world economy.
5. Discuss agriculture in the 21st century.
6. Identify agricultural products from each continent. (Assignment Sheet 1)
7. List agriculture-related businesses in your neighborhood. (Assignment Sheet 2)
8. Interview someone who works in agriculture or in an agriculture-related industry. (Assignment Sheet 3)
9. Identify a future agricultural product or a future use for a present-day agricultural product. (Assignment Sheet 4)

SUGGESTED ACTIVITIES — INTRODUCTION TO AGRICULTURAL INDUSTRY I

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit. Speakers appropriate to this unit include a county extension agent, a commodities broker, a banker, an economist, a history instructor, local business men affected by agriculture, and other people who have been involved in agriculture and have seen great changes in the industry.

- Make arrangements for any audio visual equipment that will be needed in this unit.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with agricultural industry to their definitions.

- Begin classroom work by discussing the introduction to the unit. Ask students to list other ways cotton has been used. Or substitute an example you feel more comfortable with.

- Have students list words they associate with agriculture.

- Have students begin an "ag dictionary" by listing terms in a notebook and adding to the list throughout the course.

- List words and phrases that are agricultural in nature, but used in other ways.

  EXAMPLES: "reap what you sow," describing people as "sheep" or "wolves"

Objective 2: Select from a list true statements about how agriculture relates to the everyday person.

- This objective is designed to give students a broad overview of agriculture and its benefits. Students who are not familiar with agriculture should be encouraged to find a link with the industry through this objective.

- Illustrate how much work can be necessary to produce a single product by hatching chicken eggs. Incubate the eggs for 6-8 weeks. Follow instructions provided by the manufacturer of your incubator. Monitor temperature closely. After hatching, give the chicks to a student with access to chicken-production facilities.

- Have students keep a one-day "ag use diary" in which they list every agricultural product or activity that they use.

- Challenge students to name a career that is totally non-reliant on agriculture. Point out that even careers seemingly unrelated rely on ag products and income. For example, a rap singer uses paper for contracts and sheet music, sells tapes and records, both of which are made from ag products, wears cotton jeans and a leather jacket, and sells music to people who make their living through agriculture.

- Divide students into groups. Tell the students to assume they are space travelers who have just landed on a planet and must make arrangements to live. As a group, have them determine what they would do to survive in each of the following cases. In each case assume tools and seeds needed are available from the crashed spacecraft, but only limited food and water supplies are available.

  Group 1 - Landed on a desolate planet with soil which is totally incapable of supporting any type of agriculture (crops or livestock).

  Group 2 - Landed on a planet which has no life (plant or animal) but should be capable of supporting agriculture.

  Group 3 - Landed in a "Garden of Eden" full of plants and wildlife.

  Have each group discuss the plans they made. Compare the plans and discuss how agriculture affected them.

- Have students complete Activity Sheets 1 - 4.
- Use Transparency Masters 1-3.
- Use Student Supplement 1 to help students relate agriculture to the everyday person.

Objective 3: Choose the word or phrase that completes statements about how agriculture has affected history.

- Invite a historian or history teacher to discuss agriculture in history.
- Have students discuss how agriculture has affected their family history. Have them include family careers and where the family has lived.
- Have students survey current newspapers and television news programs, watching for agriculture-related stories. Have students predict how the stories will affect future history.
- Challenge students to find a major event in history which was not related to agriculture in any way.
- Arrange for the class to visit a museum with antique tractors and plows. Discuss how farming the plains changed America.
- Review the history of Oklahoma and your local area. Explain how agriculture in this area has affected America.
- Discuss how modern farm techniques made the movement to urban centers possible.

Objective 4: Select from a list true statements about agriculture and the world economy.

- Invite an economist, banker, or commodities broker to discuss the importance of agriculture in the world economy.
- Students may find it difficult to understand that the economies of Oklahoma and Micronesia, for example, are related. Discuss how Oklahoma's agricultural industry affects the world and vice-versa.
- Have students complete Assignments Sheet 1, 2, and 3.
- Use Transparency Masters 4 and 5.

Objective 5: Discuss agriculture in the 21st century.

- Invite students to bring newspaper stories or magazine articles about changes in agriculture to class.
- Discuss agricultural experiments in space.
- Discuss Biosphere II and the future use of similar communities in space and undersea research.
- Discuss the population explosion and its effect on agriculture.
- Have students list trends in America today that will affect agriculture in the future.
- Have students complete Assignment Sheet 4.

APPLICATION

Objective 6: Identify agricultural products from each continent.

- Use the world map found in the teacher's packet accompanying this publication.
- Have students draw a small picture of each product they identify and pin it to the map.
- Expand the assignment by requiring more products from each country or more than one country per continent.
- Require each student to select a different country to research.
- Draw trade patterns on the map. Place a plastic sheet over the map and draw with grease pencils or water based markers.
- Have students complete a similar activity identifying agricultural products in the U.S.
- Prepare students by discussing Student Supplement 2 and visiting your school or local library. Be sure students know how to use card catalogs and reader's guides.

Objective 7: List agriculture-related businesses in your neighborhood.

- Do not limit listed industries to those usually considered "agricultural-related." The goal of this assignment is to make students aware of the role of agriculture in their community. Allow students to list any business using agricultural products, as long as the appropriate product is identified.

- Use Transparency Master 1 to help students identify businesses.

- Separate businesses into horticultural, field crop, livestock, and forestry products.

- Point out that city parks, museums, and individual families also use agricultural products and methods.

- Use a city map to identify agriculture-related industry in your area. Mark each one. Mark other areas of the community that are agriculture-related.

Objective 8: Interview someone who works in agriculture or in an agriculture-related industry.

- Invite a newspaper reporter to conduct an interview before the class and discuss interview techniques.

- Tell students they will be required to conduct other interviews in later units of this book.

- Use a video recorder to tape some student interviews. With the help of your school's audiovisual instructor or another expert, compile the interviews into a newsreel and present it to the class. Combine these films with tapes of experts who visit the class.

Objective 9: Identify a future agricultural product or a future use for a present-day agricultural product.

- Allow students to use their imaginations. Future products or uses can be fantastic, as long as the use is beneficial to agriculture.

- Divide students into groups and assign a type of agriculture to each group. Have each group come up with a new tool, make or draw a model, and discuss its use.

- Have each student discuss how agricultural changes will affect home life in the future.

- Have students design the kitchen of tomorrow.

- Have students list developments in other areas that will affect agriculture. For example, if transporter beams, like those in *Star Trek*, are available, cattle and crops will not have to be transported by truck or rail.

- Have students construct a model of a farm of the future.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Agricultural Sciences*. Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112. Discusses how scientists and agricultural experts are involved with crops, soil, horticulture, and animals. (10 minutes, color, VHS)
- *The Brain Drain*. Illinois Farm Bureau, Field Services Division, 1701 Towanda Avenue, Bloomington, IL 61701. Humorous science-fiction film features "agribusiness aliens" and discusses agricultural careers. Includes interviews with agribusiness professionals. (17 minutes, color, VHS)

- *Careers.* American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605. Series of six films discuss agricultural careers. Films include: *"Careers–Marketing Specialists," "Careers–Social Service Professionals," "Careers–Agricultural Producers," "Careers–Education and Communication Specialists," "Careers–Agricultural Scientists," and "Careers–Financial Specialists and Managers."*

- The Cooperative Extension Service and Agricultural Experiment Stations of Oklahoma State University, Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550. Offers a large selection of videos. These videos are also available from your local county extension agent.

- *Food: Will There Be Enough?* Prentice-Hall Media, Inc., P. O. Box 3000, Mt. Kisco, NY 10549. Discusses the land shortage and increasing demand on agriculture. (2 filmstrips and teacher's guide)

- *From Blue Jeans to Ice Cream.* Alabama Farmers Federation, P. O. Box 11000, Montgomery, AL 36198. A group of teenagers, trying to find where blue jeans and ice cream come from, find some interesting agricultural origins. (14 minutes, color, VHS)

Print Media

- *Business in Our Community.* American Institute of Cooperation, 50 F Street, NW, Suite 900, Washington, DC 20001. 24-page booklet describes the importance of business in America.

- *Careers in the Science of Agriculture.* Pennsylvania College of Agriculture, Dept. of Agriculture and Extension Education, University Park, PA 16802. Teacher Education Series, Vol. 28, No. 2, AGDEX 900.

- *Farm Facts.* American Farm Bureau Federation, Information Division, 225 Touhy Avenue, Park Ridge, IL 60068. 28-page booklet covers many aspects of agriculture with clear, attractive charts and graphics. Includes map of major American agricultural crops.

- *Farming for Our Future.* American Farm Bureau Research Foundation, 225 Touhy Avenue, Park Ridge, IL 60068. Educational comic book and teacher's guide. Includes information on food production and processing, the importance of agriculture, and the efficiency of American farmers.

- *Farming's Fantastic Facts.* Oregon Women for Agriculture, 11871 SE Eola Hills Road, Amity, OR 97101. 65-page booklet covers agricultural history, processes, animals, equipment, processing, marketing, and sales.

- *Nutrition, Food, and Culture.* National Live Stock and Meat Board, 444 North Michigan Avenue, Chicago, IL 60611. Kit with study prints and lesson plans. Compares the food habits, traditions, and agricultural practices of eight cultures.

- *The Reliable American Farmer.* Ford New Holland, MS 306, 500 Diller Avenue, New Holland, PA 17557. 12-page folder describes the contributions made by American farmers and ranchers.

- *Resource Guide.* Alabama Ag in the Classroom, Department of Agriculture and Industries, P. O. Box 3336, Montgomery, AL 36193. Lists resources available nationwide. Revised in 1991.

Software

- *Micro-Tutor Series Version 4.0.* American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens Georgia 30605. Software generates customized tests and quizzes on many phases of agriculture. Programs are available in Conservation, Corn Production, Crop Production, Forage Production, Small Grains, Soil Science, Soybean Production, FFA, Farm Finance, Farm Machinery, Farm Management, General Biology, Micro-computers, Parliamentary Procedure, Tractors, Forestry, Horticulture, Bulbs, Perennials, Annuals, Deciduous Shrubs, Deciduous Trees, Evergreens, Greenhouse Crops, Fruit Production, Vegetable Production, Insects & Diseases, Landscape Design, Landscape Maintenance, Perennials, Pruning, Turf & Groundcovers, Wildflowers & Native Plants, Beef Production, Dairy Production, Feeds & Feeding, Horses, Meats, Poultry Production, Sheep Production, Swine Production, Forestry, and Artificial Insemination. For use on IBMs and compatibles.

UNIT REFERENCES

- *Americans in Agriculture; Portraits of Diversity, 1990 Yearbook of Agriculture.* United States Department of Agriculture.

- *Farm Facts.* American Farm Bureau Federation: Park Ridge, IL.

- Wright, John W., Ed. *The Universal Almanac: A New Almanac for an Expanding Universe of Information.* Andrews and McMeel: Kansas City, 1989.

INFORMATION SHEET

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

OBJECTIVE 1

Match terms associated with agricultural industry to their definitions.

- **agriculture** – the science and art of raising crops and livestock
- **business** – the buying and selling of products and services
- **crops** – plants raised for profit or use
- **livestock** – animals raised for profit or use
- **products** – items grown or made for sale or use
- **trade** – the exchange of goods or money

OBJECTIVE 2

Select from a list true statements about how agriculture relates to the everyday person.

Agriculture is the art and science of raising crops and livestock. It is one of the oldest industries on Earth. It is practiced in every part of the world. But, you might be asking, how does agriculture affect you?

For some of you, agriculture already takes up much of your life. You were up early this morning, caring for livestock before you left for school. Others among you may have never grown a plant or touched an animal larger than a dog.

No matter how much time you spend working in agriculture, no matter whether you live in a large city or on a remote farm, no matter whether you couldn't wait to begin Agricultural Education or you wish you could take another class, *agriculture affects your life.*

The food you eat, the clothes you wear, the paper you use, even the air you breathe is part of agriculture. Green lawns, zoos, and flower shops are all part of agriculture. Products made from agricultural products include photographic film, medicines, synthetic rubber, cosmetics, and countless others.

WHAT IS AGRICULTURAL?

You might never see a plastic tree, but plastics are frequently agricultural products. The first plastic, called celluloid, was made from the chemicals found in plant walls. The plastic used to make phonograph records and many other synthetics, such as synthetic rubber, is made from resins in evergreen sap. Plastic is such an important part of our world, technology is finding newer and better methods of making plastics from agricultural products.

An important new rayon cloth is made from corn and wheat stalks, straw, and wood pulp. Synthetic fabrics have been made from many agricultural products, including the hooves of slaughtered animals!

Agriculture not only provides these wonderful products, it also improves our lives. Agriculture is one of the most effective means we have to control environmental pollution and cleanse our air and water. The money generated by agriculture provides jobs and income for over 21 million Americans.

Almost one in every five Americans works in an agriculture-related job.

Efficient agricultural practices make food in America safe, fresh, nutritious, and low-cost. In fact, Americans spend an average of 10.3 percent of their incomes on food, compared with 18 percent in Japan, 31.9 percent in Mexico, and 52.6 percent in India.

OBJECTIVE 3

Choose the word or phrase that completes statements about how agriculture has affected history.

What one force helped build the Roman Empire, led to the discovery of the New World, spurred Westward expansion, and led to both the Revolutionary and Civil Wars? The answer is agriculture.

Agriculture shaped much, perhaps most, of the world's history. Clans and tribes claimed land for planting and growing crops, raising livestock, and hunting grounds. The first towns in the world sprang up around agricultural trading centers. Letters and numbers were devised in order to record agricultural trades. Later, explorers searched for agricultural riches and trade routes. These voyages led to the discovery of America.

Agricultural trade united city-states into nations and strengthened bonds between allies. Taxing agricultural products, on the other hand, led to revolution and crucial events in American history:

- The American Revolution started because the British tried to tax the colonists on agricultural products such as tea.
- Shortly after the revolution, when the new American government taxed corn, farmers threatened to rebel. Newly-elected President Washington called for the first civil use of Federal troops to stop the uprising, known as Shay's Rebellion.
- The Civil War was primarily a clash between a manufacturing-based northern economy and southern agriculture-based economy.
- Native Americans fought for the preservation of their hunting grounds and came into bloody conflict with settlers when the Indian food supply was threatened.
- In an effort to avoid the 1991 Gulf War, America and its allies withheld agricultural products from Iraq. The lack of affordable agricultural products contributed to the demise of the Soviet Union.

Hardly a war, alliance, or exploratory voyage has ever occurred that was not related to agriculture. It has led to man's greatest discoveries and inventions and shaped our cultures, our world, and our history.

OBJECTIVE 4

Select from a list true statements about agriculture and the world economy.

Agriculture has given us letters and math, changed the world, and kept us dressed and fed. But primarily, agriculture is a business. One of the goals of agriculture is making money.

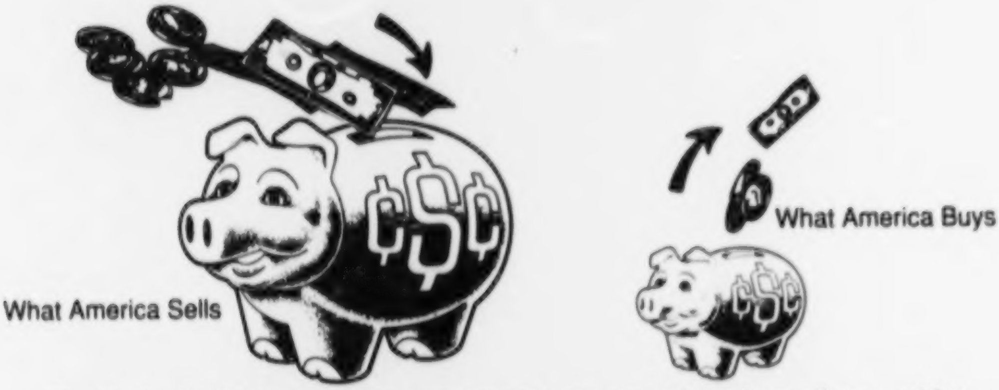
Growing crops and raising livestock, processing agricultural products, and selling those products are very profitable businesses.

Estimates and totals of agricultural sales, the total number of farms, etc., vary widely. For example, the same year the Farm Bureau estimated that each farm sold $21,000 worth of agricultural products, the USDA estimated the average farm sold just over $65,000 worth. Why the differences?

There are two primary problems anytime these statistics are compiled. First is the definition of a farm and second is the policies that complicate the figures.

Most people recognize a farm as any property that sells $1,000 in agricultural product sales in a year. This is the definition used for income taxes. There is no limit to the size of the property or its basic use. The agricultural product does not have to be raised solely on the land in question. For example, if a person buys a bull then sells it, he or she can claim to be a farmer if the bull sold for at least $1,000.

Much of our agricultural profit comes from selling products to other countries. In 1990, American crops sold for almost 20 billion dollars more than Americans spent on agricultural products from other countries.



The U. S. sells $20 billion more than it spends on ag products from other countries

International trade of agricultural products is one of the most powerful forces in the world's economy. After all, every person has to eat. In fact, it is such a powerful force, it is used for more than just business – it is used to shape political influence and relationships around the world.

Agricultural products are sent to nations in emergency situations, especially when that nation's government is friendly with American policies. On the other hand, when foreign nations adopt policies we oppose, agricultural trade is decreased.

Trading agricultural products is also a method of strengthening ties with other countries. In the 1970's former President Richard Nixon opened trade with the People's Republic of China. His first goal was to form a trade agreement, focusing largely on agricultural products. He expressed the importance of the trade agreement by claiming America would never go to war with the "people we do business with."

OBJECTIVE 5

Discuss agriculture in the 21st century.

What faces us in the future? What problems will we have? How will they be solved? In many cases, the answer lies in agriculture.

More than any other industry, agriculture will be called upon to deal with the rapidly-growing world population. Feeding and clothing the world will be very difficult. Land will be needed for housing and other uses, as well as for agriculture.

In 1980, approximately 4.45 billion people lived on Earth. By 1990, that number had grown to 5.29 billion and by 2000, more than 6.25 billion people will be alive. Each year after that, the world's population is expected to grow by over 96 million people.

The huge population will generate more pollution and waste. Wildlife will be more threatened and natural resources will be used even more quickly than they are today.

Using modern farming techniques, food and fiber for the average American can be raised on a piece of land about the size of a football field.

As the world is changing, agriculture is also changing. Computers and new communication devices make farmers and ranchers more efficient. New farming techniques conserve soil and protect the environment. Farming will take place not just on land, but on ocean floors or possibly in specially-built communities in space. More Americans will have agricultural careers that deal with trade and technology, rather than hands-on farming. These changes will help American farmers continue to feed the world.

In 1940, the average American farmer produced enough food and fiber for 18.5 people; by 1970 enough for 73.1 people. Today's farmers each produce enough food and fiber for 128 people: 94.3 Americans and 33.7 people abroad.

AGRICULTURE STATISTICS

- Agriculture is the nation's largest employer, with 21 million people working in some phase–from growing food and fiber, to selling it at the supermarket.
- U. S. agricultural trade produced a trade surplus of $17.7 billion in fiscal year 1990, and $18.2 billion in fiscal year 1989.
- Crops from 102 million acres were exported in 1987. That was 32 percent of the nation's 302 million harvested crop acres.
- The average per acre value of U. S. farm real estate (land and buildings) in 1990 was $693, compared with $667 in 1989 and $632 in 1988.
- Total land in farms, estimated at 987.7 million acres for 1990, was the lowest ever, down from 1,039 million acres in 1980.
- The average size of U. S. farms in 1990 was 461 acres, compared with 426 acres in 1980.
- Approximately 11.3 million Americans either live on a farm, work on a farm, or receive income from farming.
- About two-thirds of farm workers are farm family members and one-third are hired workers.
- Texas had the most farms (186,000) in 1990. Next came Missouri (108,000), Iowa (104,000), Kentucky (93,000), Minnesota (89,000), Tennessee (89,000), Ohio (84,000), and Illinois (83,000). Oklahoma was twelfth (72,000).
- Consumers spent an average of $1,691 for food in 1989, compared with $1,645 (1989 dollars) in 1979 and $1,5221 (1989 dollars) in 1969.
- Each U.S. consumer is supported annually by the output of only one and one-quarter acres of land.
- There are 131,641 farms operated by women in the United States.
- 45 percent of the 2.1 million farms in this country are operated by part-time farmers.

- 71 percent of U.S. farmers own all of the land that they operate.

- Average total annual sales are $21,304.

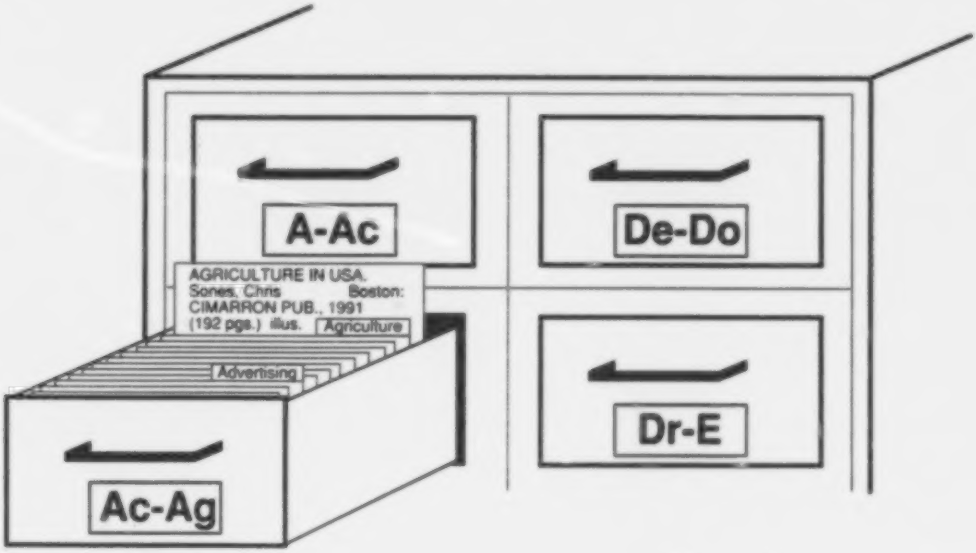
Used with permission of American Farm Bureau Federation.

HOW TO FIND IT

A library is more than just a room full of books. If you know how to use it, a library is a wealth of information.

To find information in your library, you need to know how to use two things: the card catalog and references.

The *card catalog* is information about all the books in the library. Information about each book is kept on a file card. The cards are stored in alphabetical order in card catalog drawers. Some card catalogs are separated into three categories: title, author, and subject. Each book is listed in all three categories. Some libraries are using computers instead of card catalogs.



References, on the other hand, are books that are used to look up information quickly. You are probably familiar with maps, dictionaries, and encyclopedias, which are all references. But there are other important references, including the following:

- **Thesaurus** – A book of synonyms (words that mean the same thing)

  EXAMPLE: Book – journal, volume

- **Almanac** – A book with a wide variety of information, including what happened during a specific year

  NOTE: Almanacs can be general, with a wide variety of subjects, or can be specialized, listing only information about a specific topic, such as business, sports, or government. An example of a specialized almanac is the annual *Farmer's Almanac.*"

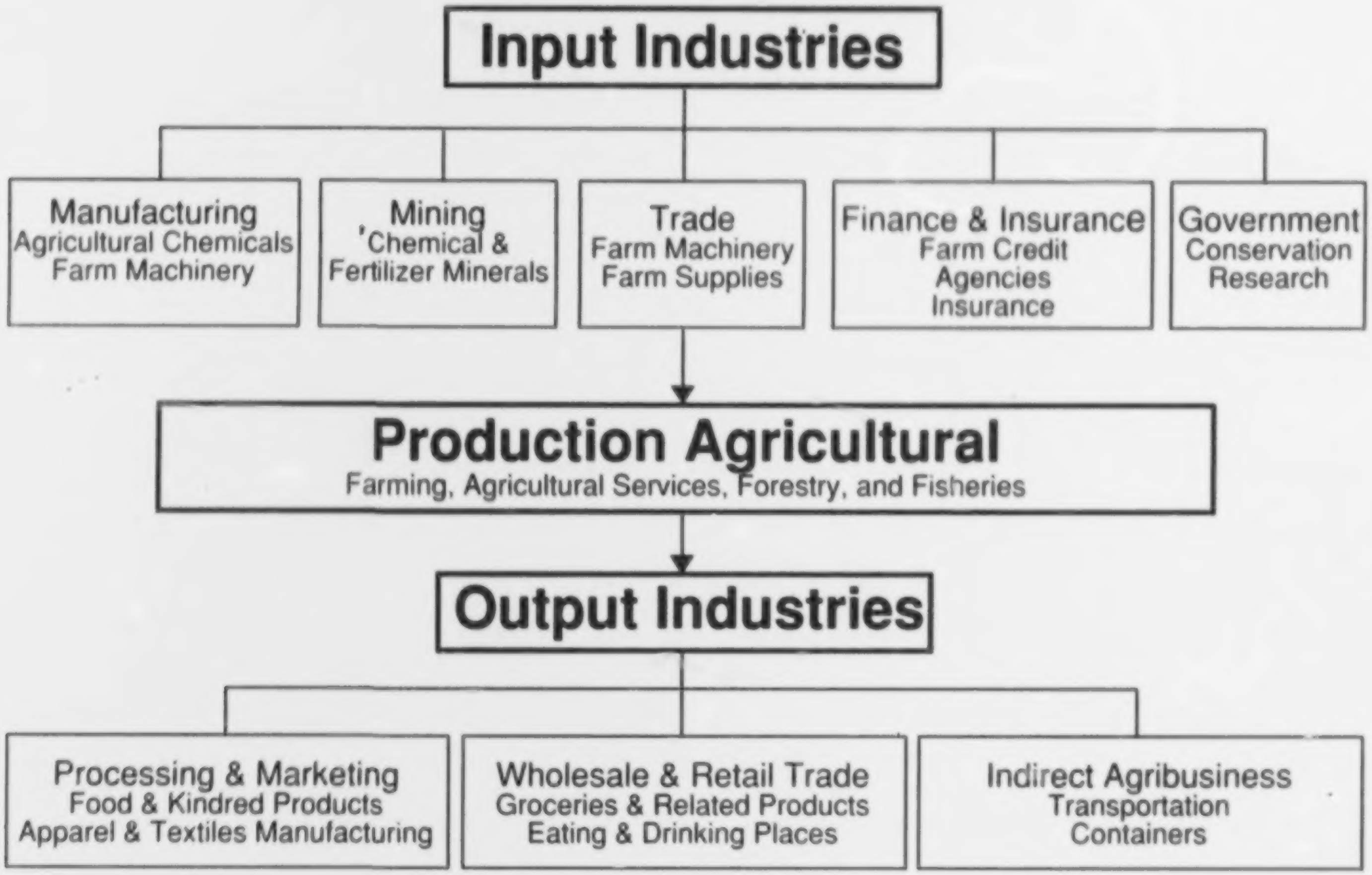
- *Yearbooks* and *Who's Who* – Books focusing on people, trends, and statistics in a specific business

- *Reader's Guide to Periodic Literature* – A book listing magazine articles, listed by subject, and the magazines in which they appear

  NOTE: "Periodic" means "occurring at regular time intervals." For example, your school classes are periodic. Similar publications list newspaper articles found in major newspapers and journal articles in professional journals.

There are many more references in your school and local library. To learn about how to use your library's references, talk to your librarian.

The Food and Fiber System



Input Industries

- Manufacturing: Agricultural Chemicals, Farm Machinery
- Mining: Chemical & Fertilizer Minerals
- Trade: Farm Machinery, Farm Supplies
- Finance & Insurance: Farm Credit Agencies, Insurance
- Government: Conservation, Research

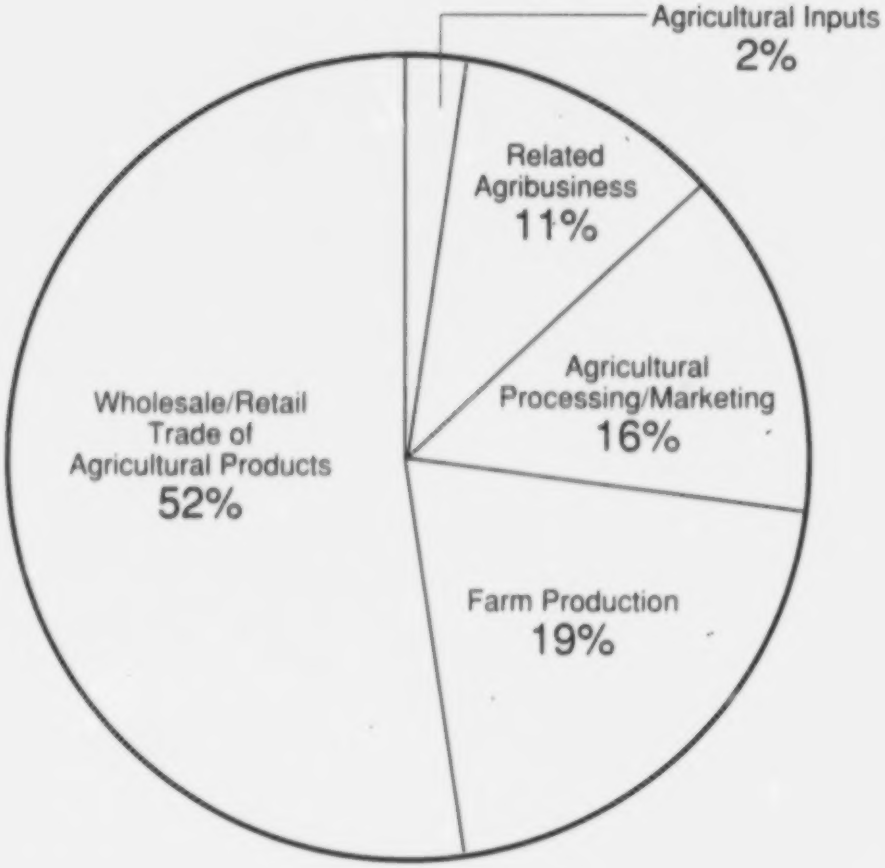
Production Agricultural
Farming, Agricultural Services, Forestry, and Fisheries

Output Industries

- Processing & Marketing: Food & Kindred Products, Apparel & Textiles Manufacturing
- Wholesale & Retail Trade: Groceries & Related Products, Eating & Drinking Places
- Indirect Agribusiness: Transportation, Containers

1990 Yearbook in Agriculture

Jobs in the Food and Fiber System



1990 Yearbook in Agriculture

METRO AND NONMETRO FOOD AND FIBER SYSTEMS JOBS

1986

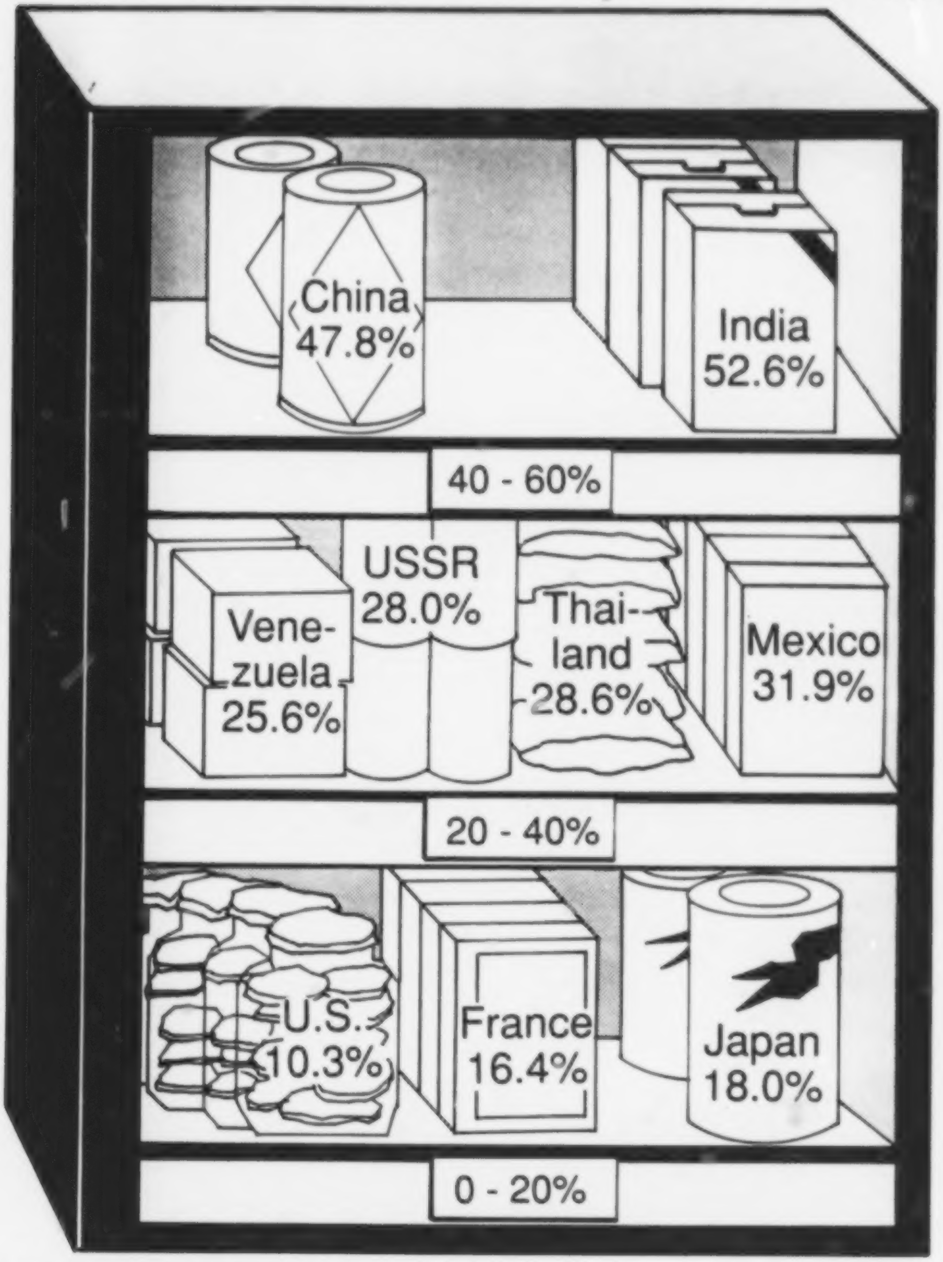
	Jobs (millions)	
Industry	**Metro**	**Nonmetro**
Total employment	86.6	20.1
Agricultural employment	14.1	5.9
Farm production	1.4	2.4
Input industries	.2	.2
Processing and marketing	1.9	1.1
Food and kindred products manufacturing	1.0	.4
Apparel and textiles manufacturing	.3	.5
Other processing and marketing	.2	.2
Wholesale and retail trade	8.6	1.8
Other indirect agribusiness	1.9	.4

Detail may not sum to total because of rounding

— 1990 Yearbook in Agriculture

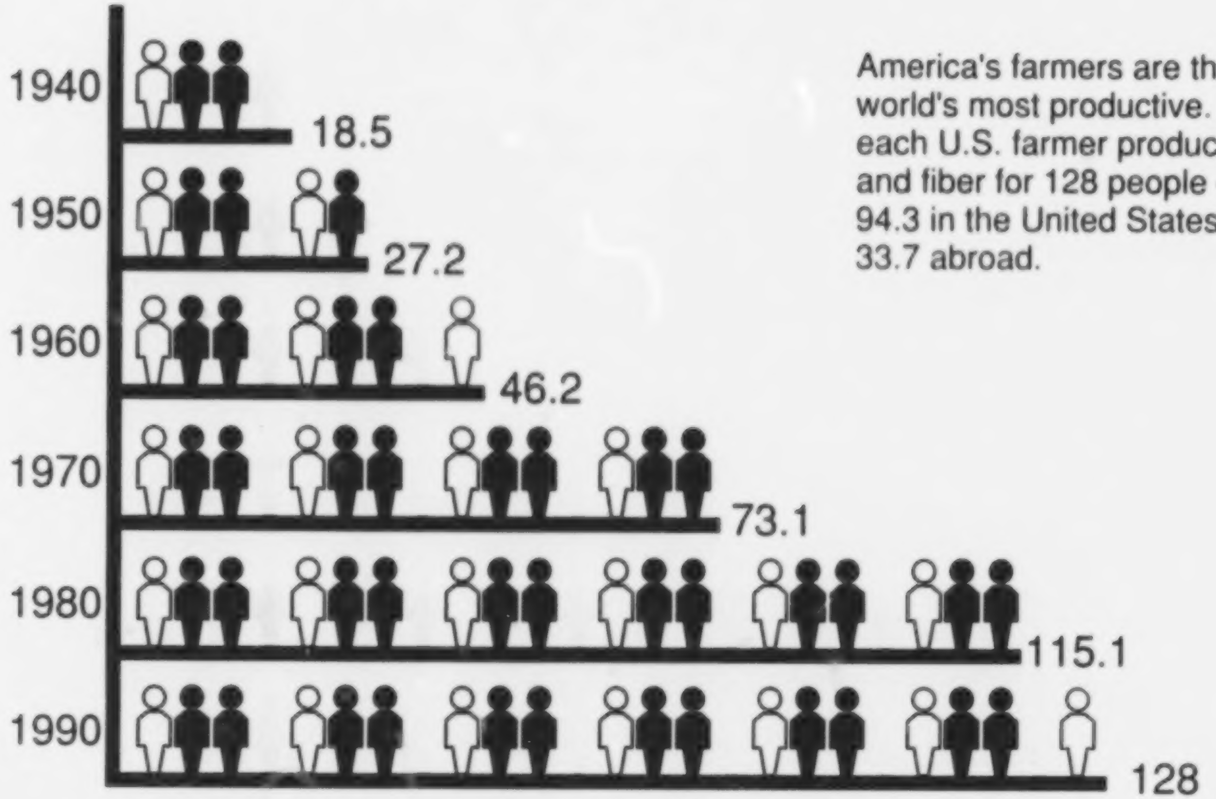
U.S. Food Is Most Affordable

Percent of Income Spent for Food



Adapted with permission of American Farm Bureau Federation.

Number of People Fed by One Farmer



America's farmers are the world's most productive. Today, each U.S. farmer produces food and fiber for 128 people — 94.3 in the United States and 33.7 abroad.

Adapted with permission of American Farm Bureau Federation

ACTIVITY SHEETS 1-3

Development of:
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why creative thinking/problem solving is important.
- Discuss with them the following skills which are relevant to this task:

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Collecting/recording information
  - Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc.)
- If students have difficulty collecting/recording information:
  - Suggest they read or examine their sources carefully, noting the key words and ideas.
  - Suggest that they list the questions they are trying to answer before they begin collecting information.
- If students have difficulty applying intuitive thinking techniques:
  - Review the use of intuitive thinking techniques.
  - Practice using the thinking techniques.

ACTIVITY SHEET 1

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

Cognitive Activities Skills

- Collect/record information
- Apply intuitive thinking techniques

Name ______________________ Score __________

ANALYZE THE AGRICULTURAL INFLUENCES AROUND YOU

Right now, as you sit at your desk, list every agricultural product you can see. (Hint: be sure to include any plastics, since they are also made from agricultural products.)

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
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45. ______________________________

Cognitive Activities Skills

- Collect/record information
- Apply intuitive thinking techniques

Name ______________________________ Score __________

JOBS INVOLVED IN PRODUCING A CHICKEN DINNER

Even a product that requires little processing can create several different jobs. For example, processing a chicken into a chicken dinner is fairly simple. Before it reaches your supermarket, however, several people must do their job. List the jobs involved in getting a chicken dinner to your table.

Chicken

EXAMPLE: Truck driver

Potatoes and Gravy

EXAMPLE: Chemical salesman

Green Beans

EXAMPLE: Farm implement salesman

Bread and Butter

EXAMPLE: Creamery operator

ACTIVITY
SHEET 3

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

Cognitive Activities Skills
- Collect/record information
- Apply intuitive thinking techniques

Name ______________________________ Score ____________

THERE'S MORE THAN BEEF IN A BURGER!

List agricultural-related products and industries involved with the operation of your favorite fast-food restaurant. (Hint: remember that agriculture-related products and industries are related. For example, the people who make pickles out of cucumbers will be on the list along with people who grow cucumbers.)

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____
11. ____
12. ____
13. ____
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15. ____
16. ____
17. ____
18. ____

19. ____________________

20. ____________________

21. ____________________

22. ____________________

23. ____________________

24. ____________________

25. ____________________

ACTIVITY SHEET 4

Development of:
READING SKILLS
CREATIVE THINKING/PROBLEM SOLVING

- Introduce the assignment to the students by discussing why reading and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Gaining factual information
  - Selecting useful resources
  - Locating resources
  - Finding materials in library (using cataloging systems, using classifying systems, etc.)
  - Using standard references (dictionary, encyclopedia, reader's guides, thesaurus, etc.)
  - Using magazines and newspapers

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Collecting/recording information

- If students have difficulty gaining factual information:
  - Suggest they read carefully, noting key words and ideas.
  - Instruct them to make a list of the questions they hope to answer.
- If students have difficulty selecting useful resources:
  - Discuss various resources they could use.

- Discuss the type of information needed.

  EXAMPLE: Definitions, dates, instructions, historical facts, names

- Suggest a general information resource such as an encyclopedia or the card catalog as a starting point.
- Review basic library skills.

- If students have difficulty finding materials in library:
  - Discuss the type of cataloging system in use.
  - Demonstrate the use of the cataloging system.
  - Instruct them to practice the use of the cataloging system.
  - Discuss the arrangement of the library.
  - Discuss the importance of being skilled in the use of the library.
  - Remind them that librarians are available to assist them.
- If students have difficulty in using standard references:
  - Locate and explain the purpose of the reference section of the library.
  - Discuss the fact that each standard reference provides a specific type of information.
  - Discuss what kind of information the students need to find.
  - Review the use of in-book reference tools.
  - Discuss the importance of being able to use standard references.
- If students have difficulty using newspapers and magazines:
  - Discuss the main goals and purposes of various newspapers and magazines.
  - Examine the structure of various magazines and newspapers.
- For additional suggestions on teaching basic skills refer to Instructional Supplement 1.

ACTIVITY
SHEET 4

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

Name ____________________ Score __________

LOOK IT UP

Use the information in Student Supplement 1 to research the following questions. Answers can be found in your local public library.

1. How many Americans live on farms?

____

2. What is a *windbreak*?

____

3. How much rain fell on your state last month?

____

4. What are three magazines that deal with agriculture or an agriculture-related topic?

____

____

____

5. What is the record for the world's largest tomato?

____

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Select useful resources
- Locate resources
- Find materials in library
- Use standard references
- Use magazines and newspapers

Cognitive Activities Skills
- Collect/record information

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, creative thinking/problem solving, and social studies skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Gaining factual information

  - Using standard references

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Collecting/recording information

  SOCIAL STUDIES SKILLS

  - Collecting/recording data

  - Interpreting maps/globes

  - Investigating/applying world geography

  - Investigating/applying principles of economics

- If students have difficulty gaining, collecting, or recording factual information or data:

  - Instruct them to read or examine their sources carefully, noting key words and ideas.

  - Remind them of the importance of recording data precisely.

- If students have difficulty interpreting maps/globes:
  - Review basic map reading skills.
  - Instruct them to examine the orientation of the map.
  - Instruct them to examine the legend of the map.
  - Instruct them to examine the scale of the map.
  - Discuss the importance of being able to read a map correctly.
  - Discuss the importance of location to country.
- If students have difficulty investigating/applying world geography:
  - Discuss the importance of knowing about other countries.
  - Discuss the impact other countries have on the United States.
  - Discuss the impact the United States has on other countries.
  - Discuss the ways that a country's location can affect its economy, welfare, defense, etc.
  - Discuss ways geography affects history.
- If students have difficulty investigating/applying principles of economics:
  - Discuss the importance of understanding world economics.
  - Discuss the ways the economy of a nation impacts the economy of another country.
  - Discuss the ways that the economy of a country impacts world economics.
  - Review the terms related to the economy:

    EXAMPLE: Import, export, gross national product, trade balance, etc.
  - Discuss the importance of maintaining a healthy economy.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 1

INTRODUCTION TO AGRICULTURAL INDUSTRY

Name ______________________________ Score ____________

OBJECTIVE 6

Identify agricultural products from each continent.

INTRODUCTION

Agriculture is an important industry in every country of the world. However, different crops are grown in different parts of the world. Sometimes the same crops are grown, but the products are used differently. For example, in the middle east lamb is the most commonly used meat and grapes are grown, not only for the fruit, but also for the leaves, which are eaten with meat and vegetables.

DIRECTIONS

1. Using a globe or world map, find the name of one country on each continent.

North America ______________________________

South America ______________________________

Europe ______________________________

Asia ______________________________

Africa ______________________________

Australia ______________________________

NOTE: Antarctica is also a continent, but is not included in this assignment sheet. You might also find Europe and Asia combined into one continent, Eurasia, in many of your textbooks. In this assignment sheet, however, they are considered separately.

2. Using an encyclopedia or other reference, look up each country and list three agricultural products produced in that country.

Country 1 ______________________________

____

____

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Use standard references

Cognitive Activities Skills
- Collect/record information

Information Analysis Skills
- Collect/record data
- Interpret maps/globes

Social Studies Application Skills
- Investigate/apply world geography
- Investigate/apply principles of economics

Country 2 ______________________________

____

____

Country 3 ______________________________

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Country 4 ______________________________

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Country 5 ______________________________

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Country 6 ______________________________

____

____

78

ASSIGNMENT SHEET 2

Development of:
READING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Gaining factual information
  - Using standard references (telephone book, city directory)
  - Using magazines and newspapers

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Collecting/recording information
  - Identifying critical elements/issues

- If students have difficulty identifying critical elements/issues:
  - Instruct them to read or examine their sources carefully, noting key words and ideas.
- For additional suggestions on teaching basic skills refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 2

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

Name ______________________________ Score ____________

OBJECTIVE 7

List agriculture-related businesses in your neighborhood.

INTRODUCTION

How many people in your neighborhood work in agriculture-related industries? You might be surprised at the answer! The baker, the grocer, and the person who cooks your school lunch all work in agriculture-related jobs. A person who sells stationery, a floral designer, and a veterinarian also work in agriculture-related jobs. Use this assignment sheet to discover just how important agriculture is to your town.

DIRECTIONS

1. Your instructor will give you a telephone book, newspaper, or city directory.
2. Look in the publication your instructor gives you and list every business you find that is agriculture-related and tell how it is related to agriculture.
3. Mark direct agriculture businesses with an "A" and agriculture-related businesses with an "R."
4. If you run out of blanks, use a piece of notebook paper to continue your list.

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Use standard references
- Use magazines and newspapers

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues

EXAMPLE:

A 1. Merle's Butcher Shop Sells livestock products

R 2. Shoe City Sells shoes made of leather (livestock)

R 3. Bridal Boutique Sells wedding dresses made of cotton and linen; wedding cakes made of flour

Business **Relationship to Agriculture**

____ 1. ____

____ 2. ____

____ 3. ____

_____ 4. ______________________________

_____ 5. ______________________________

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_____ 54. ______________________________

_____ 55. ______________________________

ASSIGNMENT SHEET 3

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, interpersonal or relating, creative thinking/problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Taking notes

  ORAL COMMUNICATION SKILLS

  - Applying active listening skills
  - Applying questioning techniques
  - Conducting/receiving interviews
  - Communicating with professional colleagues/associates

  INTERPERSONAL OR RELATING SKILLS

  - Interacting with professional colleagues/associates

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Collecting/recording information
  - Identifying critical elements/issues

  EMPLOYABILITY SKILLS

  - Investigating employment prospects of a career field/occupation
  - Investigating requirements for a career field/occupation

  - Investigating benefits of a career field/occupation

- If students have difficulty taking notes:
  - Review the information in this unit on taking notes.
  - Remind them to focus on the main point or issue.
  - Suggest they practice taking notes.

- If students have difficulty applying active listening skills:
  - Encourage them to familiarize themselves with the subject matter before the communication begins.
  - Have them practice listening and then repeating the information.

    EXAMPLE: Student, "What is your career?"
    Professional, "I am a commodities broker."
    Student, "What does a commodities broker do?"

  - Suggest that they be ready to listen before the communication begins.
  - Stress the importance of focusing on the speaker.
  - Remind them that maintaining eye contact enhances listening ability.

- If students have difficulty applying questioning techniques:
  - Instruct them to be prepared and have their questions organized before the communication begins.
  - Stress the importance of accurate questioning to obtain information.

- If students have difficulty conducting/receiving interviews:
  - Remind them to organize their thoughts and questions before the interview begins.
  - Remind them to familiarize themselves with background information on the subject to be discussed and the person to be interviewed.
  - Review oral communication and interpersonal or relating skills.

- Discuss with them the fact that interviewing sometimes makes students nervous. Instruct them to remember that the interview is a conversation.
- Remind them of the importance of being a good listener.
- Remind them not to get so intent on asking all their questions that they fail to hear all the answers.

- If students have difficulty communicating with or interacting with professional colleagues/associates:
  - Review listening skills.
  - Review questioning techniques.
  - Remind them that professional colleagues/associates are one of the best sources of information.
- If students have difficulty investigating employment prospects of a career field/occupation:
  - Suggest they read current information on the career field.
  - Suggest they discuss the career field with a professional.
  - Have them list questions they have about the career field.
- If students have difficulty investigating requirements for a career field/occupation:
  - Suggest they read current information on the career field.
  - Suggest they discuss the requirements with a professional.
  - Discuss with them the educational requirements for the career field.
- If students have difficulty investigating benefits of a career field/occupation:
  - Suggest they read current information on the career field.
  - Suggest they discuss the benefits with a professional.
  - Discuss the various types of benefits to be considered when investigating a career field.

    EXAMPLE: Money, insurance, location of work, personal satisfaction, opportunities for advancement, job security
- For additional suggestions on teaching basic skills refer to Instructional Supplements 1 and 4.

ASSIGNMENT SHEET 3

INTRODUCTION TO AGRICULTURAL INDUSTRY

Name ______________________ Score __________

OBJECTIVE 8

Interview someone who works in agriculture or in an agriculture-related industry.

INTRODUCTION

You might not have realized it before now, but you probably know several people who are employed in agriculture or in agriculture-related jobs. Learn more about those jobs and how important agriculture is to the people you know by interviewing a person who works in agriculture or in an agriculture-related industry.

As you conduct the interview, remember that the goal of the interview is to let the person you are interviewing talk, and for you to listen and learn. Begin the interview with research and preparation, but, during the interview, if you hear something interesting or surprising, ask about it first, then go on to the next item on your list. Encourage the person you interview to talk about what is most important to him or her, not what you thought would be important when you prepared for the interview.

Remember to thank the person for his or her time.

DIRECTIONS

Research Skills
- Take notes

Listening Skills
- Apply active listening skills

Interactive Communication Skills
- Apply questioning techniques
- Conduct/receive interviews
- Communicate with professional colleagues/associates

1. Begin an interview by reviewing what you already know. List at least five things you already know about the person or business that might be useful during the interview.

   1.______________________________

   2.______________________________

   3.______________________________

   4.______________________________

   5.______________________________

2. Decide what questions you should ask. Avoid questions that can be answered "Yes" or "No." Be sure your questions reflect the relationship between the job and agriculture. List at least five questions in addition to the ones below. Remember that listing more questions will improve the quality of your interview.

General Relating Skills
- Interact with professional colleagues/associates

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues

Job Search/Selection Skills
- Investigate employment prospects of a career field/occupation
- Investigate requirements for a career field/occupation
- Investigate benefits of a career field/occupation

1. What is your career?

____

____

2. How long have you held this job?

____

3. What other agricultural jobs have you held?

____

____

____

____

4. What is a typical day like for you?

____

____

____

____

____

____

____

____

5. Why did you choose this career?

____

____

____

6. How did you prepare for this career?

7. How has agricultural education helped you?

8. What changes have you seen in this field?

9. What changes do you expect to see in this field?

10.

11. ____

____

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____

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12. ____

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13. ____

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____

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14. ____

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____

____

3. As you ask each question, write down the person's comments. Write down any other information he or she gives you or anything you want to ask later. Use the next page for your notes.

4. Report to your class about the interview and what you learned.

NOTES

ASSIGNMENT SHEET 4

Development of:
WRITING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why writing and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Using standard grammar, spelling, and capitalization.
  - Stating ideas clearly

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Identifying critical elements/issues
  - Defining a problem
  - Predicting results/outcomes
  - Devising a solution
  - Creating a finished product (written)
  - Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc)

- Emphasize to the students that criteria for grading their assignment will include all of the following:

  1. Creativity of idea
  2. Clarity of explanation of product use, production, and future use
  3. Language skills--Use of correct grammar, punctuation, capitalization spelling, and complete sentences.
  4. Neatness

- If students have difficulty using standard grammar, spelling, and punctuation:
    - Suggest they review basic language skills.
    - Emphasize the importance of being able to communicate through writing.
    - Examine each area of language skills to determine which area is causing difficulty and review that area.
- If students have difficulty stating ideas clearly:
    - Instruct them to use simple, concise language.
    - Instruct them to organize their thoughts before they begin writing.
    - Suggest they construct a simple outline to help organize the information.
    - Suggest that they read the paper aloud to themselves or another person to determine the clarity of the writing.
- If students have difficulty defining a problem:
    - Suggest they examine their sources carefully to determine the problem.
    - Instruct them to use intuitive thinking techniques (brainstorming) to define a problem.
- If students have difficulty predicting results/outcomes:
    - Read or examine carefully any information pertaining to the properties of the materials being used.
    - Suggest they use intuitive thinking skills.
- If students have difficulty devising a solution:
    - Emphasize the importance of being able to state the problem clearly.
    - Suggest they use intuitive thinking techniques to formulate possible solutions.
    - Examine the chosen solution to determine if it will solve the problem.

- If students have difficulty creating a finished product:
    - Review language skills.
    - Review the requirements of the assignment.
    - Suggest they use intuitive thinking techniques to formulate an idea.
    - Suggest they use the requirements of the assignment as the basis for an outline.
- For additional suggestions on teaching basic skills refer to Instructional Supplements 1 and 4.

ASSIGNMENT SHEET 4

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

Name ______________________ Score __________

OBJECTIVE 9

Identify a future agricultural product or a future use for a present-day agricultural product.

INTRODUCTION

Like any other science, agriculture changes every day. New discoveries are made and new uses for old products are devised. For example, seedless watermelons are available today and eggs were agricultural products for centuries before they were used to make penicillin. What does the future hold in store for agriculture? What changes will be engineered for plants or animals? What new products will be discovered? How will we use agricultural products differently?

DIRECTIONS

1. Choose an agricultural product, either currently produced or an imaginary product you think will be available in the future.
2. Write a description of the product, how you think it will be produced in the future, and how it will be used in the future. Use correct grammar, spelling, and punctuation.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Cognitive Activities Skills
- Identify critical elements/issues
- Define a problem
- Predict results/outcomes
- Devise a solution
- Create a finished product
- Apply intuitive thinking techniques

SUGGESTED
EVALUATIVE CRITERIA

1. Creativity of idea . . . . 35 points
2. Clarity of explanation of product use, production, and future use . . . . 35 points
3. Language skills–Use of correct grammar, spelling, punctuation, capitalization, and complete sentences . . . . 20 points
4. Neatness . . . . 10 points

ASSIGNMENT ANSWERS — INTRODUCTION TO AGRICULTURAL INDUSTRY — I

ASSIGNMENT SHEET 1	At least three products from each continent should be identified. See Suggested Activities for further discussion of this assignment.
ASSIGNMENT SHEET 2	Do not try to limit "agriculture-related" to exclude jobs using agricultural products but not commonly classified as agriculture related. This assignment is designed to encourage the student's awareness of our reliance on agricultural products.
ASSIGNMENT SHEET 3	At least five background facts should be listed. They should reflect an understanding of how the job relates to agriculture. At least five questions should be listed. They should also reflect the relationship between agriculture and the job and should not be yes/no questions. Notes of the interview should include information other than direct answers to listed questions. See Suggested Activities for more information on this assignment.
ASSIGNMENT SHEET 4	The product should be identified, described, and its production and use detailed. Supporting information should be noted and rewarded. Use this assignment to stimulate the student's imagination. See Suggested Activities for more information on this assignment.

WRITTEN TEST

INTRODUCTION TO AGRICULTURAL INDUSTRY

I

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with agricultural industry to their definitions. Write the correct letter in the blank.

_____ 1. Animals raised for profit or use

_____ 2. Items grown or made for sale or use

_____ 3. Plants raised for profit or use

_____ 4. The buying and selling of products and services

_____ 5. The exchange of goods or money

_____ 6. The science and art of raising crops and livestock

a. agriculture

b. business

c. commerce

d. crops

e. food

f. imports

g. livestock

h. products

i. trade

OBJECTIVE 2

Select from a list true statements about how agriculture relates to the everyday person. Write an "X" in the blank before each true statement.

_____ 1. Agriculture, unfortunately, cannot contribute to controlling pollution.

_____ 2. Agriculture is one of the oldest industries on Earth.

_____ 3. Agriculture is practiced in every part of the world.

_____ 4. Products made from agricultural products include tapes and records, razor blades, and styrofoam.

_____ 5. Agriculture is found primarily on the larger continents and only rarely on island nations.

May be photocopied for student use.

_____ 6. Green lawns, zoos, and flower shops are all part of agriculture.

_____ 7. Products made from agricultural products include photographic film, medicines, synthetic rubber, cosmetics, and countless others.

_____ 8. Americans spend more than half their income on food.

_____ 9. Agriculture is one of the most effective means we have to control environmental pollution and cleanse our air and water.

_____ 10. The money generated by agriculture provides jobs and income for over 21 million Americans.

_____ 11. Efficient agricultural practices make food in America safe, fresh, nutritious, and low-cost.

_____ 12. The money generated by agriculture provides jobs and income for about 2 million Americans.

_____ 13. Americans spend an average of 10.3 percent of their incomes on food, compared with 18 percent in Japan, 31.9 percent in Mexico, and 52.6 percent in India.

OBJECTIVE 3

Choose the word or phrase that completes statements about how agriculture has affected history. Write the correct letter in the blank.

_____ 1. The first towns in the world sprang up around

a. sea ports
b. river junctions
c. agricultural trading centers
d. hunting grounds

_____ 2. Letters and numbers were devised to record

a. agricultural trades
b. historical dates
c. maps
d. crop records

_____ 3. Explorers searched for agricultural riches and

a. land
b. trade routes
c. slaves
d. scientific knowledge

May be photocopied for student use.

_____ 4. Taxing agricultural products has led to

- a. revolution
- b. increased agricultural production
- c. decreased agricultural production
- d. economic reform

OBJECTIVE 4

Select from a list true statements about agriculture and the world economy. Write an "X" in the blank before each true statement.

_____ 1. One of the goals of agriculture is making money.

_____ 2. Growing crops and raising livestock, processing agricultural products, and selling those products are very profitable businesses.

_____ 3. Most of our agricultural profit comes from selling agricultural products in America.

_____ 4. The goal of agriculture is feeding as many people as possible.

_____ 5. Nearly 75 percent of all farmers are forced to work part-time, because of low average incomes from agricultural products.

_____ 6. Much of our agricultural profit comes from selling the products to other countries.

_____ 7. Agricultural products are sent to nations only when those nations can pay for the products.

_____ 8. In 1990, American crops sold for almost 20 billion dollars more than Americans spent on agricultural products from other countries.

_____ 9. International trade of agricultural products in one of the most powerful forces in the world's economy.

_____ 10. Agricultural products are sent to nations in emergency situations, especially when that nation's government is friendly with American policies.

May be photocopied for student use.

OBJECTIVE 5 **Discuss agriculture in the 21st century.**

1. How will the size of the world's population affect agriculture?

2. How is agriculture changing? Write four ways in the space below.

May be photocopied for student use

NOTE: Objectives 6-9 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

OBJECTIVE 1

1. g
2. h
3. d
4. b
5. i
6. a

OBJECTIVE 2

2, 3, 6, 7, 9, 10, 11, 13

OBJECTIVE 3

1. c
2. a
3. b
4. a

OBJECTIVE 4

1, 2, 6, 8, 9, 10

OBJECTIVE 5

1. Discussion should include the following:
   - More people will need to be fed and clothed
   - Land will be scarce
   - More pollution will be generated
   - Wildlife will be threatened more
   - Natural resources will be used even more quickly than they are today
2. Discussion may include any four of the following:
   - Agriculture will be called upon to deal with the rapidly-growing world population.
   - Computers and new communication devices make farmers and ranchers more efficient.
   - New farming techniques conserve soil and protect the environment.

- Farming will take place not just on land, but on ocean floors or possibly in specially-built communities in space.

- More Americans will have agricultural careers that deal with trade and technology, rather than hands-on farming.

OBJECTIVE SHEET

RECORD KEEPING

II

INTRODUCTION

Here's a test. See if you can think of one job that doesn't include record keeping. It certainly isn't in agriculture. Financial records, herd records, profit and loss statements, equipment costs, feed costs, crop records, the list goes on and on. Maybe a job that's exotic, like a music star. They don't keep records, do they? Well, they have to copyright all their music, and make sure their royalties are paid. They have to pay the back-up band, personal staff, and accountant. All that takes record keeping. Maybe a simple job, like a dishwasher. They don't keep records, right? Not unless they don't have a time sheet, a paycheck or income taxes to pay. Coaches keep play books and stats, teachers keep grade books, doctors and vets keep medical records, secretaries keep correspondence files, disk jockeys keep play schedules, and mechanics keep invoices. No matter what you do, records must be kept. Learning to keep complete, accurate records early makes it easier.

UNIT OBJECTIVE

After completing this unit the student will be able to identify types of records and their uses. The student will demonstrate these competencies by completing assignments sheets and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with record keeping to their definitions.
2. List reasons for keeping good records.
3. List records you may need to keep.
4. Complete math problems associated with record keeping.
5. Calculate market profit or loss. (Assignment Sheet 1)
6. Take notes. (Assignment Sheet 2)
7. Keep a register. (Assignment Sheet 3)
8. Use a computer. (Assignment Sheet 4)
9. Build a budget to buy a car. (Assignment Sheet 5)

PREPARATION

- Order materials to supplement unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Invite a variety of people to talk about the importance of good record keeping. Be sure to include a banker or accountant, someone who is involved in agriculture, and someone who uses a computer to keep records.

  NOTE: Supply guest speakers with the Objective Sheet, Information Sheet and any other components you want them to cover.

- Allow the students time to complete records you assign. Assignment Sheets 1 through 4 will require at least one week to complete.

- Tell students to save test scores for use with Assignment Sheet 4.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with record keeping to their definitions.

- Have students find examples of each of the documents listed in the objective.
- Add math terms, as needed.
- Keep a class list of records. Ask students to add to the list as often as possible. Offer a prize for the most unusual record.
- Assign Assignment Sheet 1, to be completed during unit coverage. Relate it to current market trends.

Objective 2: List reasons for keeping good records.

- Use guest speakers and personal experience to illustrate the need for records.
- Have students name records other people keep about them and why. Grade reports, school attendance and behavior, medical records, and work records are good examples.
- Use Student Supplement 1 to illustrate the need and importance of keeping good records.

Objective 3: List records you may need to keep.

- Be sure students realize that records do not have to be official or on forms. If they keep a list of telephone numbers, a calendar, or have any IOU's, they are keeping records.
- Ask students to discuss record keeping with their parents. Have them ask about records they keep at home, records they keep at work, and how much time goes into record keeping.
- Distribute tax forms, such as 1040 and W-4 forms and have students list the information they would need to complete the forms.
- Use Transparency Masters 1-22 to show students examples of records they will be keeping in their Supervised Agricultural Experience Program.

Objective 4: Complete math problems associated with record keeping.

- Students should be familiar with all these functions, but may require some review.
- Invite a college student, accountant, or parent to discuss record keeping and math.
- Have students complete the Activity Sheet.

APPLICATION

Objective 5: Calculate market profit or loss.

- Have students complete Assignment Sheet 1.
- Avoid making this activity more than record-keeping. More detailed information about agricultural sales will be included in later units.
- Have students track other commodities or stocks and compare performances.
- Invite a stock broker to discuss reading price quotes and records associated with stock and commodity trading. Have him or her discuss the importance of accurate records in planning, predicting trends, and futures trading.
- Invite your high school applied economics teacher to discuss record-keeping and business applications.

Objective 6: Take notes.

- Have students practice taking notes by watching evening news broadcasts and taking notes on the stories presented.
- Invite a guest speaker to discuss how to take and keep notes. Contact a nearby university for names of people to contact. Most universities will have experts who help students study, take notes, and organize their work.
- Invite a high school or college student to discuss the requirements of FFA and their school. Have them discuss records they keep, how they organize their school work, and why record keeping is important to them.
- Have students complete Assignment Sheet 2.

Objective 7: Keep a register.

- Have students chart information they use in other assignment sheets.
- Have students chart the number of times they wash their hands, fight with their brothers and sisters, tie their shoes, snack between meals, or yawn in their least favorite class.
- Have students conduct a school-wide survey and chart the results. Topics might include current events, rating school lunches, or rating popular movies.
- Have students complete Assignment Sheet 3.

Objective 8: Use a computer.

- Use computers at school or at home to complete Assignment Sheet 4.
- Allow students to tour a computer showroom.
- Have students look at the mail which their family receives in one week and tally the number of pieces that are computer generated.
- Have students complete Assignment Sheet 4.
- Hardware required: IBM or compatible computer, printer, monitor, and floppy drive. The programs could be copied onto a subdirectory on a hard drive if the computer is so equipped. Nothing is encrypted and no special "tricks" or hardware are required to run the programs on either floppies or hard drives.

  Supplies required: Printer paper for the students to produce print-outs to hand in and a copy of the program diskette for the students (unless the programs are installed on the hard drive.)

  Preparation: Make working copies of the program diskette.

  Floppies

  Write protect the original in case something is entered incorrectly.

  Put the original in drive A and a formatted disk in drive B. If you want the programs to be self-starting (highly recommended), the disk you put in drive B must be a "system" disk. Consult your DOS manual for instructions to make a "system" disk.

  NOTE: If you have only one floppy drive, the commands you enter will be the same. The computer will prompt you to insert the second diskette.

  If the A drive is not the default drive, make it the default drive by entering A:

  Copy the necessary files from A: to B: by entering the following commands:

```
copy *.exe b:
copy *.?st b:
copy autoexec.bat b:
```

NOTE: If you must put the original disk in drive B and the working copy disk in drive A because of your computer's configuration, enter these commands rather than the above commands:

```
B:
copy *.exe a:
copy *.?st a:
copy autoexec.bat a:
```

Hard drive–

Write protect the original in case something is entered incorrectly.

Create a sub-directory on the hard drive by entering the following commands:

```
C:
md\aged
```

Put the original disk in drive A (drive B, if your system configuration demands it.)

Copy the necessary files by entering the following commands:

```
cd\aged
copy a:*.exe  (copy b:*.exe -- if the original is in drive B)
copy a:*.?st  (copy b:*.?st -- if the original is in drive B)
```

Program overview: After some preliminary comments and instructions to the student, the program asks for the last and first names of the student and if the student already has a data file on this diskette. If yes, the program verifies the existence of a file with a filename composed of the 1st 8 letters of the student's last name and a ".tst" (for test results). If that filename exists, it is opened and its data input into the computer's memory. If a filename of that spelling doesn't exist, or if the student has not yet saved test result or directory data, the student is prompted for a valid filename.

Specifics for the AGSTUDY program:

The student is given the option of **Quitting**, **Adding** test results & data, **Saving** the file, or **Looking** at the data.

If the student chooses the **Add** option, he/she will be able to enter the Test Name, Score, Day the Test was taken, How much time the student studied, Where the student studied, What time of day he/she studied, What distractions to study were there, and How well the student likes the course. To avoid multiple spellings of the same word, common choices are displayed with an accompanying number--most of the time the student will enter a number rather than having to spell out a word. The Menu will then be available.

If the **LOOK** option is chosen, the student is asked which study habit or test condition variable (hours studied, when the test was taken, where studying took place, etc.) The test name, score, and the designated variable for each test will be displayed on the screen. The student then has the option to print that list or not. The student is again presented with the Add, View, Quit, or Save menu.

If the student chooses **Save**, the program will save the data using a filename composed of the first 8 characters of the student's last name and an extension of ".tst". Once again, the main menu will be made available.

Operating Instructions: The programs are designed for students who may have only a little computer experience--you should not have to spend all your time running the program for each student. The instructions in the assignment sheet and the instructions which appear on the screen for the student will enable most students to use the program unattended. Knowledge and skills prerequisites are:

- How to power up a computer, printer, and monitor
- How to use a diskette and disk drive correctly
- The student should also know how to use the keyboard--typing skills aren't required, though

Instructions for the Student:

If the computer, printer, and monitor are off, insert the diskette in drive A, and turn the computer, printer and monitor on; the program will start automatically. If the program doesn't start, 1) double check that you have the right diskette and have inserted it correctly, 2) make sure the equipment is plugged in and turned on, and 3) either turn the equipment on (if it was off) or reboot (restart) by tapping the DEL key while holding down the CTRL and ALT keys. If the program still doesn't start, ask your instructor for assistance.

If the computer, printer, and monitor are already on, insert the diskette in the default disk drive and enter AGSTUDY. If the program doesn't start, follow steps 1, 2, & 3 listed above.

NOTE: If the monitor shows A>, the default disk drive is A (A is usually the one on top or the one to the left on computers with two disk drives). If the default disk drive is not the correct size for the diskette you're using, change to the other drive by entering the appropriate letter followed by a colon (for example, B:).

Follow the instructions which appear on your monitor.

Suggestions for the Instructor:

In addition to providing the student with an opportunity to working with a simple, flat database, the student could actually be motivated to use the results of the AGSTUDY program to change study habits and perhaps improve grades.

Objective 9: Build a budget to buy a car.

- Invite an automobile salesman to discuss prices and expenses of owning a car.

- Provide want ads from several newspapers. Include your local newspaper and those from nearby communities.

- Invite an insurance agent to discuss insurance and maintenance costs.

- Invite a credit counselor or banker to help students prepare a budget.

- Have students complete Assignment Sheet 5.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in parts, if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- Oklahoma State University Cooperative Extension Videotape Library, Stillwater, OK. The following films may be checked out or purchased from you local county extension agent.

  Making Ends Meet: The Family Spending Plan (VT270)
  Motivating 4-H'ers Videoconference (TC12)
  Selecting and Working with Financial Advisers (VT88)
  Tracking Your Spending (VT271)

Print Media

- The Cooperative Extension Service and Agricultural Experiment Stations of Oklahoma State University, Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550. Offers a large selection of fact sheets. These fact sheets are also available from your local county extension agent.

Software

- *Agri-Data Base*, AAVIM, 800-228-4689. Order no. PC103. Allows you to create mailing lists, to create and maintain inventories, equipment lists, and student records. Students can create and keep track of their own projects with this program for Apple computers. Useful for all levels of agricultural education classes and programs.

UNIT REFERENCES

- Ellis, David B. *Becoming a Master Student.* College Survival Inc., Rapid City, SD, 1985.
- *FFA Supervised Agricultural Experience Program Record Book.* National FFA, Alexandria, VA, 1990.
- Jones, Kelly, C. P. A. Interview, September 26, 1991.

RECORD KEEPING

OBJECTIVE 1

Match terms associated with record keeping to their definitions.

- **account** – a record of all charges, expenses, payments, and adjustments related to a person, project, or business
- **assets** – money you have, investments you have made, and anything you own that is of value; what you are worth
- **average** – the amount found by adding all amounts and dividing by the number of amounts added
- **data base** – a computer program that saves pieces of information and arranges them as needed
- **expenses** – money spent
- **file** – a set of related information or notes stored and used together
- **income** – money earned or given to you

  NOTE: There are two kinds of income. Gross income is the total of all money you receive. Net income is your profit.
- **inventory** – a list of what is owned
- **invoice** – a document listing what has been ordered, the cost of the items, the date of the order, and other information; an order form
- **journal** – a written record of activities
- **ledger** – a file of income and expenses
- **liabilities** – money owed
- **paper trail** – the set of documents that record or prove a series of events

  EXAMPLES: an order form, the packing slip, and the canceled check
- **profit** – income minus expenses

- **receipt** – a document that proves something, usually money, has been received
- **record** – a written document telling or proving something that has happened
- **resume** – a record of education, jobs, and accomplishments which can be used to get a job
- **statement** – a document showing everything that has happened in an account during the last month or quarter
- **time sheet** – a document showing time worked and not worked

OBJECTIVE 2

List reasons for keeping good records.

"To be, or not to be, that is the question." If Shakespeare had been talking about records rather than life, the line would have read "Can I prove it, or can I not, that is the question." Records are used to prove what we think happened because memory is not as reliable as something written. Most of us have quite a collection of records.

Your family probably has a box or drawer at home or a safe deposit box at the bank with a stack of records in it: birth certificates, bank books, report cards, insurance papers, land deeds, wills, student and medical records, etc. You should know where these papers are kept. These records and others serve many purposes:

- **To organize information and make it easier to use**

  EXAMPLES: Class notes, bank statements, calendars and date books

- **To meet requirements**

  EXAMPLES: Income tax forms, FFA record-books, teacher's grade books

- **To prove what happened**

  EXAMPLES: Receipts, deposit slips, attendance reports, report cards

- **To make comparisons**

  EXAMPLES: Growth charts, beginning and ending inventory, rainfall charts, vehicle maintenance records, breeding records

- **To save time**

  EXAMPLES: Address and telephone books, computer files

- **To make decisions**

  EXAMPLES: Farm records showing which crops produced the most profit or loss

OBJECTIVE 3 **List records you may need to keep.**

Records are used everywhere in everyday life, professionally and personally. You will use them in four basic places: at work, at school, at home, and for your personal information.

At work, your employer will require a record of hours worked, when you arrive and leave, and when you take days off or work overtime. The time sheet may be a card you use with a time clock, or it may just be a list of time you keep at your desk. You may also have to keep files of letters you write or receive, jobs you finish, phone calls you make, or other information. These files can be kept on forms or pads, in file folders, or on a computer.

At school, you should keep some kind of record of assignments you need to complete, grades you have made, and information you will be tested over later. These are probably kept in notebooks or on note cards.

Ag-ed records include leadership activities, project records, financial records, and exhibition records.

WHO STARTED ALL THIS, ANYWAY?

Do you get tired of "reading, writing, and 'rithmetic?" Maybe you wish you didn't have to mess with it all the time. Then maybe agriculture isn't the field for you. Not only do detailed records for inventory, loans, sales, and taxes have to kept by people in agriculture, it was agriculture that started the whole thing. That's right. Numbers, letters, and records were all invented to keep track of ag trades and deals.

The first records may be tallies of shipments or of seasons, (no one is sure which) marked on bones. Beginning about 8,000 B.C., in what is now Jordan, Israel, and Iraq, clay tokens and tallies were used to record agricultural product shipments. For example, if 200 sheep were sold, 200 tokens changed hands with the order and accompanied the sheep during transit. Later, a slab of clay with 200 marks replaced the tokens. There it was: the first written invoice.

The marks evolved into numbers, and later into letters. In 3,500 B.C. two sets of tokens were used. One represented raw products; the other represented finished products, such as cloth or bread. In 3,000 B.C., Sumaria began producing tokens representing quantity: "1" meant a small package of grain, and "10" meant a large package.

As an adult, you will be expected to keep track of expenses, that is, bills you pay to maintain your home. You should also keep an inventory of your personal belongings. You will also have to keep insurance papers, birth certificates, and other records.

In your personal life, most of your records will be financial. The most important will probably be your checkbook. Other common financial records include loan papers, certificates of ownership, contracts, statements, and receipts.

OBJECTIVE 4 **Complete math problems associated with record keeping.**

In addition to the uses for records listed in Objective 2, records can be used to plan for the future. A few simple math applications will show you changes and trends. Or you may hear about trends and apply them to your money or business.

The science of statistics is measuring trends and changes. Sometimes surveys or questionnaires are used to predict public opinion and sales records are used to track changes. In other cases, statistics are used to test products. For example, if someone claims that corn raised with a certain fertilizer is better than corn raised without it, math formulas can be used to determine how many stalks should be grown, what the chances are that the fertilizer will work, and how big a change you can expect.

Adding and Subtracting Decimals

The math used most often in records and in planning for the future is simple addition and subtraction. A decimal point is sometimes involved. When adding and subtracting figures with a decimal point, line up the decimal points.

EXAMPLES:

3.45 lb. corn/head	7.2 lbs. of fertilizer
2.1 lb. oats/head	- .75 lbs.
11.953 lbs LM protein/head	

Add zeroes where you need to fill out columns and total them.

3.450 lb. corn/head	
2.100 lb. oats/head	7.20 lbs. of fertilizer
11.953 lbs LM protein/head	- .75 lbs.
17.503 Total lbs. ration/head	6.45 lbs. of fertilizer

Multiplying Decimals

Multiplying and dividing decimal numbers is not hard, either. To multiply, ignore the decimal points and multiply the numbers.

EXAMPLE A	EXAMPLE B
3.54 lbs. pressure/sq.in.	$ 3.00 due
x 1.5 inches	x .25 percent interest
1770	1500
+354	+ 600
5310	7500

Count the number of places to the **right** of the decimal in the numbers you are multiplying. Your answer should have the same number of places to the right of the decimal in the answer. If there aren't enough places, add zeroes to the left of your answer.

Example A: 3.54 has 2 places to the right of the decimal, and 1.5 has 1 place to the right of the decimal.

5310 should have three places to the right of the decimal, so the answer is 5.310 lbs. pressure.

Example B: .25 has 2 places to the right of the decimal. 3.00 has 2 places to the right of the decimal.

075 should have four places to the right of the decimal. The answer is .7500 or $ .75 due.

Dividing Decimals

To divide numbers with decimal points, the number you are dividing by is the key. For example, if you were charged $525.00 for fence posts and know they cost $1.25 each, you can determine the number of fence posts you have by dividing $525.00 by $1.25. The $1.25 is what you work with. You have to make it a whole number. That is, you have to take out the decimal point. Do this by moving the decimal point to the end of the number.

$$1.\underset{\curvearrowright}{25}\overline{)525.00}$$

But to make the division work right, you also have to change the number being divided. Count the number of spaces you moved the decimal point in the first number, and move the decimal the same number of spaces in the second number.

$$1.\underset{\curvearrowright}{25}\overline{)525.\underset{\curvearrowright}{00}}$$

Now, put a decimal point just above it, where your answer will go.

$$125.\overline{)52500.}$$

Now divide normally.

Percentages

Some records use percentages. A percentage is just division. For example, if you keep a record of your grades and want to know what your percentage is, total the number of points you earned. Then total the number of points possible. Then divide the points earned by the points possible.

History grades

Assignment	Possible	Earned
Quiz	10	8
Review questions	25	19
Test	100	88
Report	100	75
Quiz	10	10
Test	100	92
Totals	345	292

```
          .846
345 /292.000      =85%
     2760
      1600
      1380
       2200
       2070
        130
```

Percentages can be written as a decimal:

10% is the same as .10.
100% is the same as 1.00.

Rounding

To round numbers, determine the number of digits you will round to. Move one digit to the right. If that number is 0-4, round down. If it's five or above, round up. For example, 3.2 miles rounds to 3 miles. 17.8 lbs. rounds to 18 lbs.

Averages

Averages are also used sometimes. Averages are found by adding all the amounts, and dividing by the number of amounts you added together. For example, if you want to find how long it takes you to get to school, you might measure the amount of time you travel every morning for four days.

Day 1	16 minutes
Day 2	14 minutes
Day 3	10 minutes
Day 4	12 minutes

Then you would total the minutes.

$$\begin{array}{r} 16\\ 14\\ 10\\ \underline{+12}\\ 52\end{array}$$

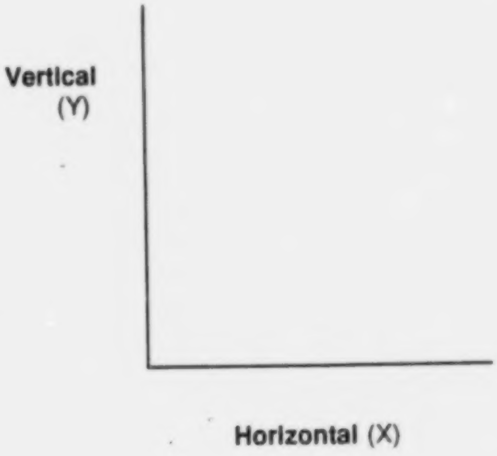
Then you divide by four.

$$\begin{array}{r} 13\\ 4\overline{)52}\\ \underline{4}\\ 12\end{array}$$

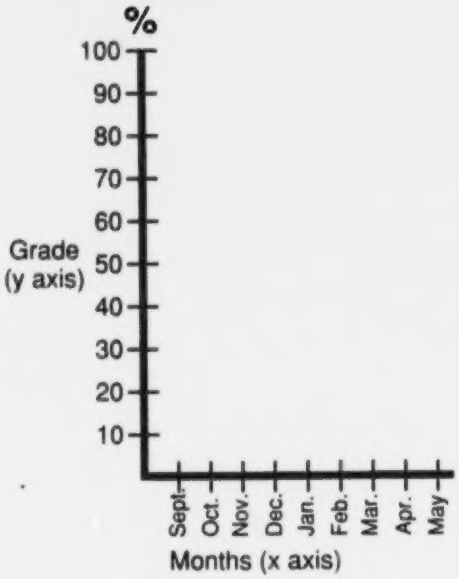
Average = 13

Graphs

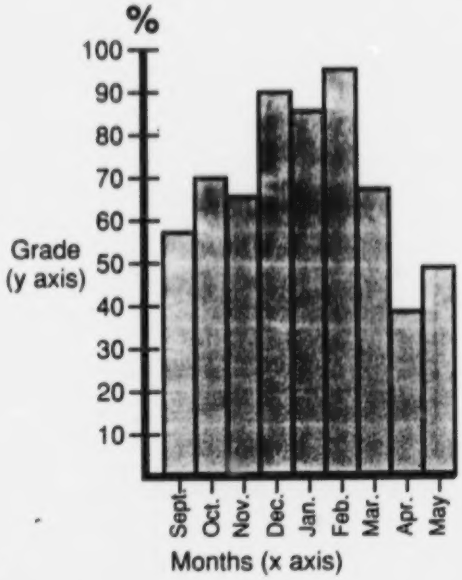
One final tool used in record keeping is a graph. Most records can be charted on simple bar graphs. Begin with a horizontal and vertical line.



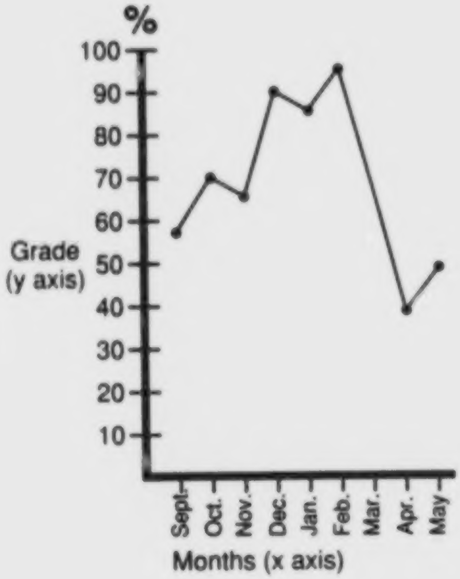
Label measurements on the vertical line and items you are measuring on the horizontal line. For example, if you are charting your monthly progress in history class, you would mark percentages (measurements) on the vertical line and each month (what is being measured) on the horizontal line.



Now, draw a line representing each month's performance.



Another way to handle graphs, is to draw a point instead of a line, and connect the dots.



JIM PIGEON'S RECORDS

Record-keeping can seem like a real hassle, but if you don't think it's important, ask Jim Pigeon, of Kansas, Oklahoma. In 1989, Jim competed as one of four finalists for FFA's National Poultry Proficiency Award. His FFA work in high school included raising livestock and poultry and running a hay-baling business with his dad and brother. His projects earned him a scholarship, the State and Regional awards, a chance to compete for the National Proficiency Award, a State FFA Degree, and an American FFA Degree, the highest awarded by FFA. "If it wasn't for those records, I sure wouldn't have gotten that," he explains.

He credits his success to his first Ag-Ed teacher, who stressed keeping accurate records. "...Everything in FFA revolves around record-books. You can't apply for awards or anything without them."

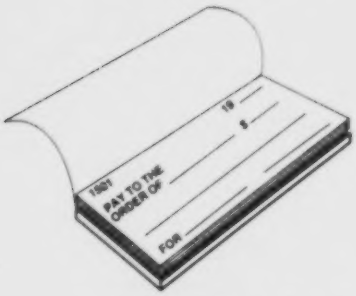
But Jim's record-books weren't always up to date. In high school he usually kept them complete. Sometimes he'd forget to fill them out for a week or two, and then "I'd have to remember all the money I spent or money I made. That's the hardest part I remember about keeping record-books." When he started college, though, he was busy with school and a part-time job, and didn't take the time to keep his record-books up to date. When news came that he was going to the national competition, he had to bring them back up to date. "I had the information — but not in the books. I just had to transfer it from check stubs and stuff, but I was in the habit of keeping it for my personal use."

His habits of keeping good records continue to help him in college. "I've always been pretty organized, or tried to be." Today he keeps his records on a computer. "I have a spreadsheet and it just takes a few seconds for me to punch it in."

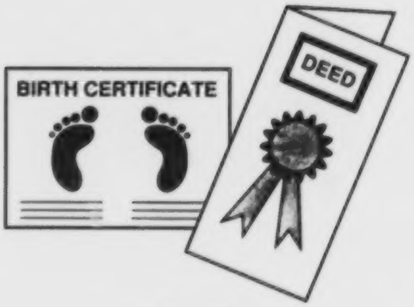
Jim's advice for you is to get in the practice of keeping records "at least, AT LEAST, once a week. I can't emphasize that enough." He also encourages "everyone even remotely involved in agriculture" to join and be active in FFA. "It will help me, like on my resume. And when I'm looking for a job, it sure helps."

TM 1

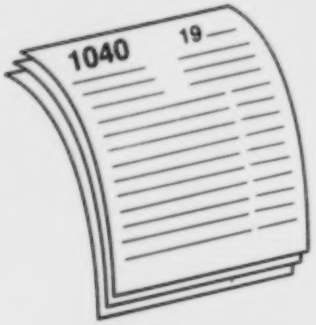
Records Everyone Keeps


1501
PAY TO THE ORDER OF
FOR
19
$

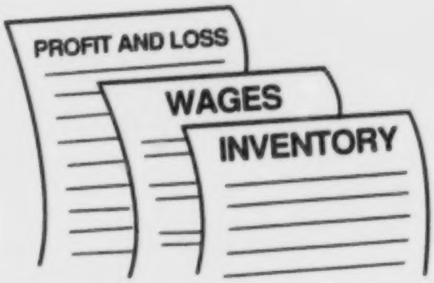
Check Books


BIRTH CERTIFICATE
DEED

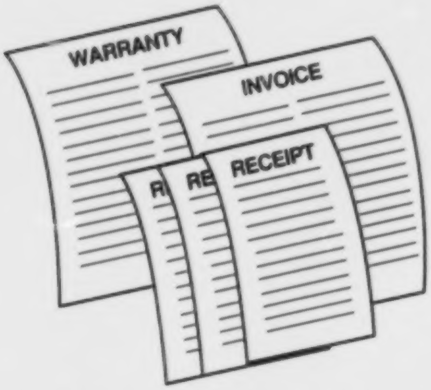
Certificates



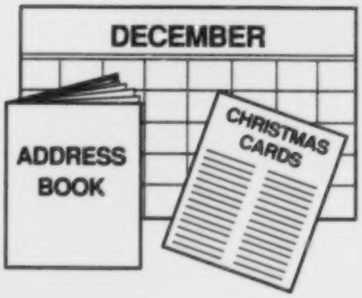
Tax Forms


PROFIT AND LOSS
WAGES
INVENTORY

Business Forms


WARRANTY
INVOICE
RECEIPT

Receipts, Bills, Guarantees


DECEMBER
ADDRESS BOOK
CHRISTMAS CARDS

Personal Lists

STUDENT'S PLAN FOR A LONG-TERM SUPERVISED AGRICULTURAL EXPERIENCE PROGRAM

Check all that apply.

19________ ☐ Lab Experience ☐ Wage Earning ☐ Ownership

19________ ☐ Lab Experience ☐ Wage Earning ☐ Ownership

19________ ☐ Lab Experience ☐ Wage Earning ☐ Ownership

19________ ☐ Lab Experience ☐ Wage Earning ☐ Ownership

19________ ☐ Lab Experience ☐ Wage Earning ☐ Ownership

ENDING INVENTORY

December 31, 19 ______

Item or Description	Total Value	Value to the Enterprise					
		1	2	3	4	5	6
Ending Inventory Totals							

DEPRECIATION SCHEDULE

Item and Description	Date Acquired	Cost Information			Adjustments	Balance to Depreciate	Life	Method	Annual Depreciation % or $	Remaining Book Value at Start of Year	Depreciation This Year - Amount	Remaining Book Value
		Remaining Book Value of Trade-in	Cash Difference Paid	Total Cost Basis								
1	2	3	4	5	6	7	8	9	10	11	12	13

Instructions, Planning and Agreements

Ownership SAE

Wage Earning SAE

Laboratory Experience SAE

Financial Records

FFA Activities

Improvement Projects · Skills

Summary

SALES AND INCOME

Date	Item of Sale and Description	Total Credit		Credit to Enterprise											
				1		2		3		4		5		6	
	Balance Forwarded														
Total Sales and Other Income															

Instructions, Planning and Agreements
Ownership SAE
Wage Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects, Skills
Summary

EXPENSES

Date	Item of Expense and Description	Total Credit		Charge to Enterprise											
				1		2		3		4		5		6	
	Totals Forwarded														
Forward Totals															

Instructions, Planning and Agreements

Ownership SAE

Wage Earning SAE

Laboratory Experience SAE

Financial Records

FFA Activities

Improvement Projects - Skills

Summary

TM 7

EXHIBITION RECORD

Record all exhibits related to ownership program.

Date	Kind of Exhibit	Where Exhibited	Placings	Prize Won	
			Total		

At end of year, transfer total to Sales and Income page, and credit to proper enterprise(s).

BREEDING RECORD

Name of Dam	Sire Used	Date Bred	Date Due	Date Born	Number Born	Number Raised

LOSS RECORD

(Do not transfer any of these values to any other page.)

Date	Number and Kind of Animals	Cause of Loss	VALUE	Date	Number and Kind of Animals	Cause of Loss	VALUE

CROP AND LIVESTOCK EFFICIENCY FACTORS

Enterprise	Number of Units, Acres, Cows, Sows, etc.	Total Production - Bushels, Offspring, Pounds, etc.	Yield Unit	Student's Share %	Landlord's Share %	Remarks

Instructions Planning and Agreements
Ownership SAE
Wage Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects - Skills
Summary

WAGE EARNING

INVENTORY

Record only inventory owned that is used directly with the wage-earning SAE program. **Do not** enter items recorded on inventory of ownership programs.

Most students with wage-earning SAE programs will not have an inventory. However, if situation warrants, transportation, special clothing, and special tools that must be provided by the student as terms of his/her employment would be considered as inventory items.

Item or Description	Beginning Value Date ________		Ending Value Date ________	
Total				

Note: The Ending Inventory Value becomes the Beginning Inventory Value of the next record book.

For an item to appear on ending inventory that was not on beginning inventory, it must be shown as purchased on expense page.

Instructions Planning and Agreements
Ownership SAE
Wage Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects · Skills
Summary

WAGE-EARNING SAE PROGRAMS
INCOME AND EXPENSES

Record income and expenses incurred only in connection with the Wage-Earning SAE Program. Income should be reported as net income (after withholding tax and other deductions). Many entries will not have related expenses. Labor exchanged for ownership expenses should be entered on this page.

Date	Employer/Business	Type Work or Item of Expense	Hours	Pay Rate	Income		Expense	
Totals								

LABORATORY EXPERIENCE

To receive credit, students enrolled in Laboratory Experience SAE programs are required to spend at least 200 hours of time on task beyond the classroom instructional time.

It is necessary for the students to keep an accurate record of the activities completed and record the information on the following pages of this section.

Information from this section will be used to verify information on applicable proficiency award applications.

Examples of Laboratory Experience programs would include, but are not limited to, work in the Agricultural Mechanics Shop, school greenhouse or land laboratory, school farm, and chapter test plots.

Date	Nature of Activity	Where Completed	Hours Worked	Cost of Materials			
				Total Cost		Your Share	
		Grand Total					

Wage Earning SAE

Laboratory Experience SAE

Financial Records

FFA Activities

Summary

FINANCIAL RECORDS

EARNINGS FROM NONAGRICULTURAL ACTIVITIES

(Do not transfer information to summary pages.)

Date	Activity and From Whom Received	Expenses		Amount Received	
	Transfer only to Line 4 of Financial Analysis Total				

Instructions, Planning and Agreements

Ownership SAE

Wage Earning SAE

Laboratory Experience SAE

Financial Records

FFA Activities

Improvement Projects · Skills

Summary

TM 14

ACCOUNTS PAYABLE

LENDER____________________

PURPOSE____________________

REPAYMENT PLAN__________ INT. RATE_____%

Date	Amount Borrowed	Payments			Unpaid Principal Balance
		Total	Interest	Principal	

Note: Unpaid Balance at end of year becomes Amount Borrowed next year

ACCOUNTS PAYABLE

LENDER____________________

PURPOSE____________________

REPAYMENT PLAN__________ INT. RATE_____%

Date	Amount Borrowed	Payments			Unpaid Principal Balance
		Total	Interest	Principal	

Note: Unpaid Balance at end of year becomes Amount Borrowed next year

ACCOUNTS PAYABLE

LENDER____________________

PURPOSE____________________

REPAYMENT PLAN__________ INT. RATE_____%

Date	Amount Borrowed	Payments			Unpaid Principal Balance
		Total	Interest	Principal	

Note: Unpaid Balance at end of year becomes Amount Borrowed next year

ACCOUNTS PAYABLE

LENDER____________________

PURPOSE____________________

REPAYMENT PLAN__________ INT. RATE_____%

Date	Amount Borrowed	Payments			Unpaid Principal Balance
		Total	Interest	Principal	

Note: Unpaid Balance at end of year becomes Amount Borrowed next year

ACCOUNTS RECEIVABLE

(Transfer information to next record book if loans have not been paid off when closing this book.)

Date	To Whom Loaned	Purpose of Loan	Amount	Rate	Date Due	Date Paid
			$	%		

GIFTS AND INCOME OTHER THAN EARNINGS

EXAMPLES: Gifts, prizes, and inheritances such as land and equipment

(NOTE: Assets which will become a part of inventory must be put on the expense page at the value shown on this page.)

Date Received	Item and Source or Nature	Value or Amount Received	
		$	
		$	
		$	
		$	
		$	
		$	
		$	
		$	
		$	
		$	

GIFTS AND DONATIONS MADE BY THE STUDENT

Date	Explanation	Cash to Dependents		Other Aid to Dependents		Church		Community Chest		State FFA Foundation		Red Cross		Other (Specify)	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
		$		$		$		$		$		$		$	
	Totals for Each Column	$		$		$		$		$		$		$	

Instructions, Planning and Agreements
Ownership SAE
Wage Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects - Skills
Summary

STUDENT'S NET WORTH STATEMENT (BALANCE SHEET)

(NOTE: This balance sheet is actually a condensed version. An actual balance sheet includes much more detail. Lenders may require an actual balance sheet.)

A. Student's Assets	**Beginning**	**Ending**
	Date________	Date________
1. Total inventory value (from pages 6 and 7)	\$________	\$________
2. Accounts receivable (from page 32)	\$________	\$________
3. Cash money on hand	\$________	\$________
4. Checking account	\$________	\$________
5. Savings account	\$________	\$________
6. Other investments (cash surrender on bonds, cash surrender value of life insurance, postal savings, etc.)	\$________	\$________
____________________	\$________	\$________
____________________	\$________	\$________
____________________	\$________	\$________
____________________	\$________	\$________
____________________	\$________	\$________
A. TOTAL ASSETS	\$________	\$________
B. Student's Liabilities		
1. Unpaid bills	\$________	\$________
2. Accounts payable (notes and mortgages) from page 32		
____________________	\$________	\$________
3. Other liabilities (specify) ____________	\$________	\$________
____________________	\$________	\$________
____________________	\$________	\$________
B. TOTAL LIABILITIES	\$________	\$________

NET WORTH (A minus B) Beginning \$________ NET WORTH (A minus B) Ending \$________

(NOTE: Beginning net worth values in this book must be the same as the ending net worth values of the previous book; ending values of this book must be the same as the beginning net worth values of the next book.)

FINANCIAL ANALYSIS

NOTE: This page is required to determine the source of funds used to cover all expenditure items. It is **not** an indication of profit or loss.

Income into the SAE Program

1. Beginning balances (cash on hand, checking account, and savings account — sum of items 3, 4, and 5 from beginning net worth statement on p. 34) $__________

2. Ownership income (pp. 10-11) $__________

3. Wage-Earning income (p. 25) $__________

4. Nonagricultural income (p. 31) $__________

5. Gifts and income other than earnings (p. 33) $__________

6. Loans taken out during current year (p. 32) $__________

7. **Total Dollars Available** $__________

Expenditures for the SAE Program

8. Ending balances (cash on hand, checking account, and savings account — sum of items 3, 4, and 5 from ending net worth statement on p. 34) $__________

9. Ownership expenses (pp. 12-17) (include expenses for which labor was exchanged) $__________

10. Wage-Earning expenses (p. 25) $__________

11. Loan payments (principal only, p. 32) $__________

12. Gifts and donations made by student (p. 33) $__________

13. **Total Dollars Spent** $__________

Difference — Line 7 Minus Line 13 $__________
(Line 7 must be equal to or exceed line 13)

Instructions, Planning and Agreements
Ownership SAE
Wage-Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects Skills
Summary

FFA ACTIVITIES

STUDENT'S PARTICIPATION IN FFA ACTIVITIES FOR AWARDS AND RECOGNITION

List activities such as any judging contest, speech contest, tractor driving, Proficiency awards, showmanship awards, Creed and Greenhand Quiz contest, Chapter Meeting contest, Top Salesperson contest, Farm Shop contest, field days, and scholarship awards.

School Year	Activity	Level of Participation					Placing
		Local	County	District	State	National	

Instructions, Planning and Agreements

Ownership SAE

Wage Earning SAE

Laboratory Experience SAE

Financial Records

FFA Activities

Improvement Projects Skills

Summary

NONCOMPETITIVE LEADERSHIP ACTIVITIES SPONSORED BY THE FFA

List in this section all noncompetitive activities that provide leadership opportunities such as speaking at civic clubs, radio and TV programs, conventions, leadership conferences and camps, chapter officer and committee responsibilities, banquets, chapter award activities (such as BOAC, Food For America, and Safety), preparation of educational exhibits at fairs, etc.

School Year	Leadership Activity	Level of Participation					Responsibility
		Local	County	District	State	National	

Instructions, Planning and Agreements
Ownership SAE
Wage Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects · Skills
Summary

IMPROVEMENT PROJECTS - SKILLS

IMPROVEMENT PRACTICES

List practices that have improved the appearance and/or usefulness of the home and immediate surroundings and have contributed to the comfort and convenience of the family. Also, list the practices that increased the efficiency and/or production of your Supervised Agricultural Experience Program. (Applies to students enrolled in any type SAE program.)

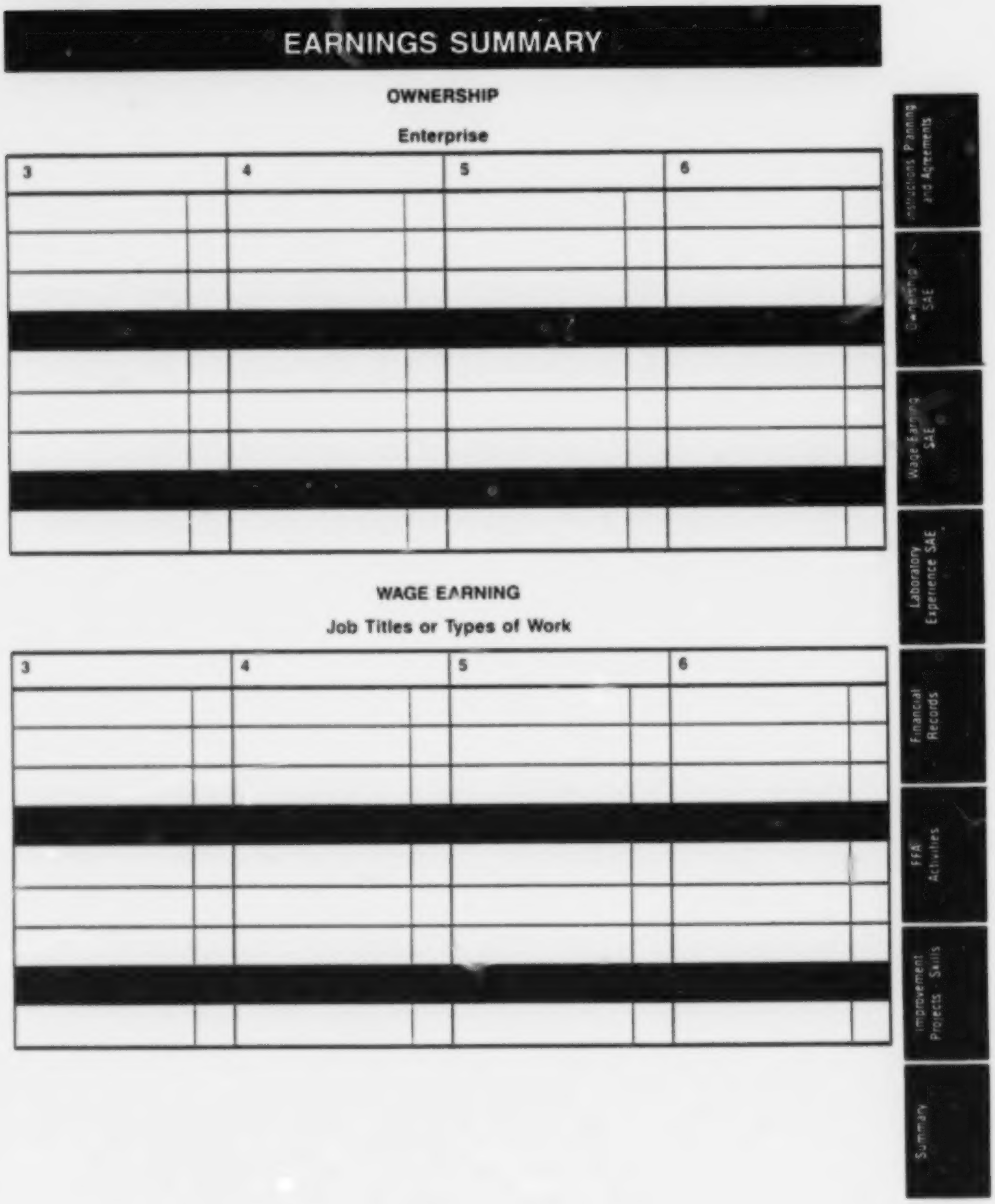
Date	Description and Size or Scope of Improvement Practice or Achievement	SAE It Pertains to	Hours of Labor			Cost of Materials					
			Student's Share	Other Party's Share	TOTAL	Student's Share		Other Party's Share		TOTAL COST	

Instructions, Planning and Agreements
Ownership SAE
Wage Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects - Sk
Summary

RECORD OF SKILLS OR COMPETENCIES

List skills or competencies that were developed because of the various enterprises in your Supervised Agricultural Experience Program. It should include those skills or competencies relating to any type SAE program.

Date	Skill or Competency Performed	SAE It Pertains To	Date	Skill or Competency Performed	SAE It Pertains To



EARNINGS SUMMARY

OWNERSHIP

Enterprise

3		4		5		6	

WAGE EARNING

Job Titles or Types of Work

3		4		5		6	

Instructions Planning and Agreements
Ownership SAE
Wage Earning SAE
Laboratory Experience SAE
Financial Records
FFA Activities
Improvement Projects · Skills
Summary

ACTIVITY SHEET

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS

- Introduce the assignment to the students by discussing why reading, writing, and mathematics skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  – Interpreting forms and records

  – Following written instructions

  WRITING SKILLS

  – Completing forms and records

  MATHEMATICS SKILLS

  – Calculating with whole numbers

  – Calculating with decimals

  – Collecting/recording data

  – Solving practical problems

  – Solving income/expense problems

- If students have difficulty interpreting forms and records:
  – Examine the structure of the forms being used.

  – Review the terminology on the form.
- If students have difficulty following written instructions:
  – Discuss the possible consequences of not following instructions precisely.

- Have them read the instructions several times, noting the key words and ideas.

- If students have difficulty completing forms and records:
  - Examine the structure of the forms being used.
  - Stress the importance of accuracy in completing forms and records.

- If students have difficulty calculating with whole numbers:
  - Review basic skills in addition, subtraction, multiplication, and division.
  - Remind them to check their work for accuracy.

- If students have difficulty calculating with decimals:
  - Explain the fact that the decimal system is based on groups of ten.
  - Remind them that our money system is a decimal money system.
  - Review addition, subtraction, multiplication, and division skills using decimals.

- If students have difficulty collecting/recording data:
  - Discuss the importance of recording data accurately.
  - Discuss the reasons for keeping accurate records.

- If students have difficulty solving practical problems:
  - Review the information that is known.
  - Discuss the fact that mathematics is necessary to solve everyday problems.

- If students have difficulty solving income/expense problems:
  - Define the terms used in record keeping.
  - Instruct them to divide the information into expenses and income.
  - Remind them that to "compare" or to "find the difference" between two amounts it is necessary to subtract the smaller amount from the larger.

ACTIVITY SHEET

RECORD KEEPING *II*

HOW MUCH ARE YOU WORTH?

Inventory your bedroom. List all your possessions and their value. Be sure you adjust their value if they are not brand new. Total their value. Inventory everything else you own. List your possessions and their adjusted values. Now list any money you have in savings, bonds in your name, or other assets. Finally, total any money you owe. Add all your assets together and subtract your liabilities. The total is your net worth.

ASSETS		LIABILITIES	
Item	**Value**	**Debt**	**$ Owed**
Total:		**Total:**	

Assets ____________

- Liabilities ____________

Net Worth ____________

Functional Reading Skills

- Interpret forms and records
- Follow written instructions

Functional Writing Skills

- Complete forms & records

Operation and Calculation Skills

- Calculate with whole numbers
- Calculate with decimals

Data Analysis and Display Skills

- Collect/record data

Functional Math Skills

- Solve practical problems

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Gaining factual information
- Using magazines and newspapers

WRITING SKILLS

- Completing forms and records

MATHEMATICS SKILLS

- Calculating with whole numbers
- Calculating with decimals
- Selecting/applying mathematical procedure
- Collecting/recording data
- Solving practical problems
- Solving income/expense problems

EMPLOYABILITY SKILLS

- Mastering specific job task/procedure

- If students have difficulty gaining factual information:
  - Suggest they read carefully noting key words and ideas.
  - Instruct them to list the questions they hope to answer.
- If students have difficulty using magazines and newspapers:
  - Examine the structure of the magazines and newspapers being used.
  - Discuss the goals and main purpose of various magazines and newspapers.
- If students have difficulty selecting/applying mathematical procedures:
  - Instruct the students to reword the problem in a form that is clearer to them.
  - Review the mathematical procedures that are relevant to this assignment.
  - Review mathematical terminology.
  - Suggest they list any facts that are given and determine precisely what quantity they are trying to find.
- If students have difficulty mastering a specific job task/procedure:
  - Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.
  - Suggest they study each component of the procedure to determine which area is causing difficulty.
  - Review the entire procedure.
  - Team them with proficient students or professionals to practice the procedure.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 1 — RECORD KEEPING — II

Name ______________________ Score ______________

OBJECTIVE 5 **Calculate market profit or loss.**

INTRODUCTION One important reason for keeping records is to be able to recognize trends and patterns. In this exercise you will track the prices of agricultural commodities.

DIRECTIONS Choose three of the following:

- Feeder cattle
- Pork bellies
- Corn
- Sorghum
- Cotton
- Wheat

Locate their current prices either in a newspaper or from television. Record the price each day for five days. Complete the record and answer the questions on the next page.

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Use magazines and newspapers

Functional Writing Skills
- Complete forms & records

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with decimals

Math Application Skills
- Select/apply mathematical procedure

Data Analysis and Display Skills
- Collect/record data

Job Acquisition/ Development Skills

- Master specific job task/procedure

1. Item _________

   Prices: Day 1 _______
   Day 2 _______
   Day 3 _______
   Day 4 _______
   Day 5 _______

   1. Were the prices up or down at the end of the week? _________
   2. What was the best day to buy? _________
   3. What was the best day to sell? _________
   4. What was the average price? _________

2. Item _________

   Prices: Day 1 _______
   Day 2 _______
   Day 3 _______
   Day 4 _______
   Day 5 _______

   1. Were the prices up or down at the end of the week? _________
   2. What was the best day to buy? _________
   3. What was the best day to sell? _________
   4. What was the average price? _________

3. Item _________

   Prices: Day 1 _______
   Day 2 _______
   Day 3 _______
   Day 4 _______
   Day 5 _______

   1. Were the prices up or down at the end of the week? _________
   2. What was the best day to buy? _________
   3. What was the best day to sell? _________
   4. What was the average price? _________

ASSIGNMENT SHEET 2

Development of:
READING SKILLS
WRITING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading, writing, and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  WRITING SKILLS

  - Constructing graphics and symbols
  - Taking notes
  - Using note cards

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Collecting/recording information
  - Identifying critical elements/issues

- If students have difficulty constructing graphics and symbols:
  - Discuss the use of graphics or symbols to convey information.
  - Remind them that using symbols can save time when taking notes.
- If students have difficulty taking notes:
  - Instruct them to review the information on taking notes in this assignment.
  - Remind them to apply active listening skills.
  - Remind them that note taking is a skill that improves with practice.

  - Discuss the importance of taking accurate notes.

- If students have difficulty using note cards:
  - Review the information presented in this assignment.
  - Discuss the fact that a single note card can isolate certain facts.
  - Stress the fact that information can be re-organized by simply rearranging the note cards.

    EXAMPLE: If a student has taken careful notes on the industrial revolution and now needs to write a paper on inventors during that time period, he or she can use the note cards relating to inventors or inventions as a resource.

  - Discuss various ways of coding note cards.

    EXAMPLE: Variety of card colors, colored dots, numerical code, alphabetical code

    A student could take notes on teacher's lectures on white cards, magazine sources on blue cards, reference books on green cards, etc.

- If students have difficulty collecting/recording information:
  - Remind them to read or examine sources carefully, noting key words and ideas.
  - Stress the importance of recording information accurately.

- If students have difficulty identifying critical elements/issues:
  - Instruct them to read or examine their sources carefully, noting key words and ideas.
  - Instruct them to listen or watch carefully for clue words that suggest a critical issue is being presented.

    EXAMPLE: Teacher, "It's important to understand the effect of the industrial revolution on the agricultural community."

  - Suggest they list the questions they hope to answer.

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 2

RECORD KEEPING

II

Name ______________________________ Score ____________

OBJECTIVE 6 **Take notes.**

INTRODUCTION

Since most of you don't work full time, own homes, or have your own checking account, the majority of your records relate to school. Taking class notes and organizing your records is not as difficult as you may think. Follow the guidelines below in all your classes and you will see that what you do with your papers can make a difference in your grades.

DIRECTIONS

1. Take notes in all your classes for one week. Use the instructions below for taking the best notes possible.
2. Show your notes to your instructor and turn in your notes for this class.

Functional Reading Skills
- Follow written instructions

Composition Skills
- Construct graphics & symbols

Research Skills
- Take notes
- Use note cards

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues

How to take good notes

1. Begin before class starts.
    - Be sure you have the right tools. What works best for you may not work best for everyone else, so try several things. In any case, you will need the following:
        - A place to keep your notes
        - A place to keep handouts
        - Two pencils
        - Two pens
        - An eraser
        - Paper or note cards

        NOTE: More information about different types of notebooks and folders will be given later.
    - Consider where you sit. Studies show that moving to the front and center of a room can raise a student's grade.

- Get your tools out before the class begins.

2. Decide what to include in your notes.

    - Don't try to write everything the teacher says. If your teacher says something you don't understand or miss, make a big question mark and ask what it was after class. Know what to include in your notes and what to ignore. Some good clues are:

        – If a teacher repeats something, write it down. If he/she continues to repeat it, put a star next to it or underline it. If the teacher keeps repeating something, it is usually important and it will probably be on a test.

        – If a teacher writes it down, you write it down. Whether the teacher uses a handout, a chalkboard, or an overhead projector, he/she wouldn't write it down if it wasn't important.

        – Try to maintain eye contact with the teacher. If you see in his/her body language that something is important, write it down. Remember, teachers are only human, and they will include what they think is important on tests, whether others think it is important or not.

        – Listen to clues like "There are three factors to remember..." or "So, what we are discovering is..." Other common clues are:

            "Remember that..."

            "So, we see that..."

            "You will recall that..."

            "As I said before,..."

            "This is important..."

            "In other words,..."

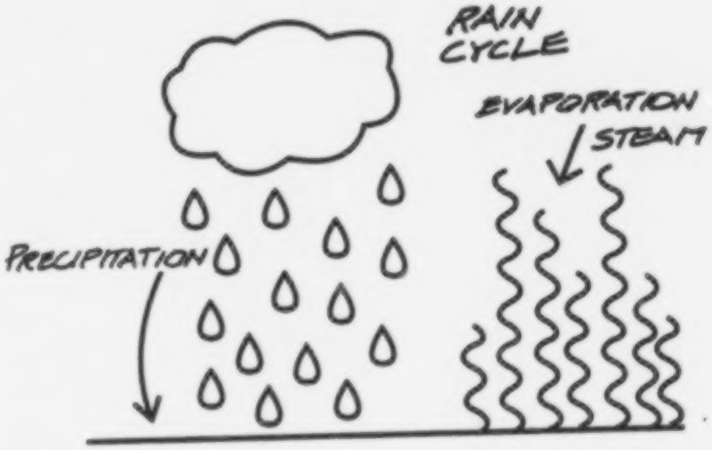
    - Watch to see if the teacher uses notes. If he/she took time to write it down once, it will probably be included in the test. So, if you see him/her refer to notes during the lecture or before writing something on the board, include it in your notes.

    - Don't ignore the obvious. If your teacher says "This will be a test question," mark that in your notes.

3. Write your notes as notes, not as reports.

   - Use abbreviations or shorthand. No one has to use your notes but you. If it looks like chicken scratches, so what? If you can read it, it works.

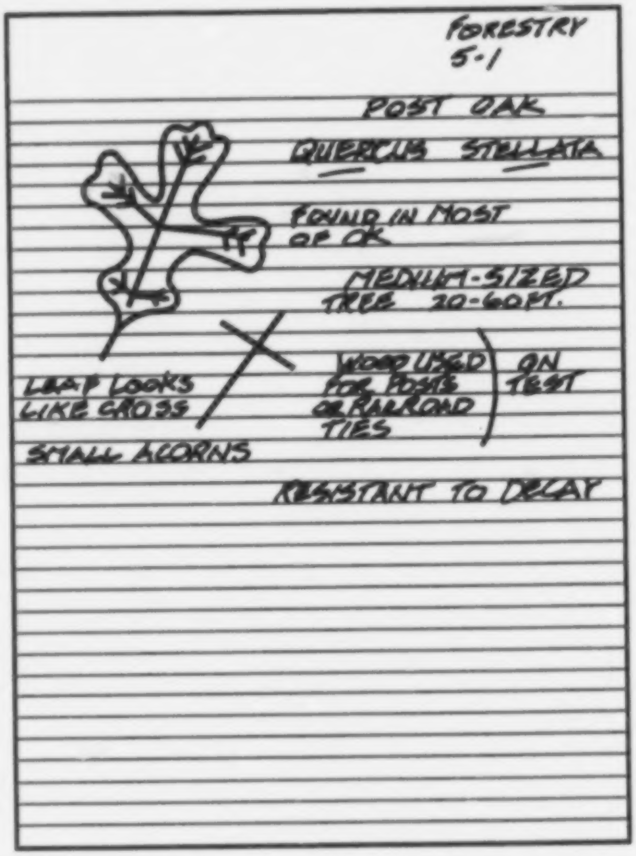
   - Use pictures.


RAIN CYCLE
EVAPORATION
STEAM
PRECIPITATION

   - Use charts

Future	Present	Past	Past Perfect
will go	am going	went	has gone
will eat	am eating	ate	has eaten

- Set up a note-taking system you can use. One good system is to divide your page in half. On one side write what the teacher is saying, on the other write comments to yourself. Another system is to diagram what is said instead of writing it in note form.



FORESTRY
5-1

POST OAK

QUERCUS STELLATA

FOUND IN MOST OF OK

MEDIUM-SIZED TREE 20-60FT.

LEAF LOOKS LIKE CROSS

WOOD USED FOR POSTS OR RAILROAD TIES

ON TEST

SMALL ACORNS

RESISTANT TO DECAY

4. Review your notes in the evening and clean them up.

   - Rewrite your notes if they are difficult to read. If you have trouble reading them tonight, when the information is fresh in your head, how are you going to read them two weeks from now? How are you going to read them at the end of the semester?

   - Organize relationships between last night's notes and tonight's notes. For example, keep a time line of history events. Every night add new dates and events and draw arrows from the past events that caused them.

   - Be sure all your notes are dated.

Organizing notes

1. Decide what tools work best for you. If you like short, quick reviews of each fact, try 3" by 5" index cards. If you like to see relationships between facts, keep your notes in a spiral notebook or three ring binder.

2. Have a place for handouts and returned assignments. Use pocket folders, file folders, or three ring binders. Keep all handouts and all returned assignments, but don't keep them together; have a special file for each.

3. At the end of each grading period, set up new files As you are tested over material, take it out of the folders you take to class every day.

4. Use color coding to make your records easy to find. You might want to use a separate color for each class or one color for current material, one for material already tested over, and another for material from past grading periods. Special projects, like term papers, might be done on colored note cards or on colored paper, to separate them from regular class work.

ASSIGNMENT SHEET 3

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, and employability skills are important.
- Discuss the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  WRITING SKILLS

  - Completing forms and records

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Calculating with decimals
  - Collecting/recording data
  - Constructing charts and tables

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1, 2, and 3.

ASSIGNMENT SHEET 3

RECORD KEEPING

II

Name ______________________________ Score ____________

OBJECTIVE 7

Keep a register.

INTRODUCTION

Sometimes records are used to track changes or levels. A checkbook register, for example, tracks changes in a checking account balance and the amount of money available. A grade book records changes in a student's average and the level of his/her performance. These records can be very important. But, some people have a hard time keeping them because every activity has to be recorded. In this assignment sheet, you will learn how to complete and use these records.

DIRECTIONS

1. Choose one of the activities below.
   - Daily calorie intake
   - Grade averages
   - Income and expenses
   - Hours spent in school or studying
   - Hours spent watching television
   - Number and length of telephone calls made and received
2. Use the next page to make a register. Each register should include a column for the date and a column for each item recorded.
3. Keep your register up-to-date for one week. At the end of the week, determine the total for each day and the average for the week. To determine the average, add the daily totals and divide by the number of days. Be careful about the number of days you use. For instance, if you are charting calorie intake and don't eat on Saturday, you have to include a "0" in your total and divide by seven. But if you are tracking your grade averages and you don't go to school on Saturday and Sunday, you ignore them, and only divide by five.

Functional Reading Skills
- Follow written instructions

Functional Writing Skills
- Complete forms & records

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with decimals

Data Analysis and Display Skills
- Collect/record data
- Construct charts & tables (numerical)

Job Acquisition/
Development Skills

- Master specific job task/procedure

Daily total, Day 1 ______

Daily total, Day 2 ______

Daily total, Day 3 ______

Daily total, Day 4 ______

Daily total, Day 5 ______

Daily total, Day 6 ______

Daily total, Day 7 ______

Daily average ______

ASSIGNMENT SHEET 4

Development of:
READING SKILLS
WRITING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Using computer data base
- Following written instructions

WRITING SKILLS

- Using standard grammar, spelling, and capitalization
- Stating ideas clearly
- Using complete sentences
- Proofreading & editing

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues
- Analyzing/synthesizing information
- Identifying/analyzing underlying causes
- Developing an action plan

EMPLOYABILITY SKILLS

- Mastering specific job task/procedure

- Emphasize to the students that criteria for grading their assignment will include all of the following:

  1. Two printouts listing the data for at least 8 tests.
  2. Thoughtful analysis of data
  3. Plan to improve test scores
  4. Correct spelling, grammar and punctuation
  5. Neatness

- If students have difficulty using computer data base:

  – Remind them that data bases are used in business, industry, research and finance every day.

  – Review the basic operating instructions for your computers.

  – Remind students to go slowly, follow all instructions and that if they make a mistake, they can start over with no difficult consequences.

  – Discuss a data base as an electronic method of handling all types of information and ask for examples that they are already familiar with.

  EXAMPLES: How could they use a data base for keeping records on various farm operations? Mileage, repair costs, speed in 60 seconds for various types of cars?

- If students have difficulty using standard grammar, spelling, and capitalization.:

  – Review basic grammar skills.

  – Review rules for using capitals.

  – Encourage them to use a dictionary to check the spelling of any words of which they are uncertain.

  – Discuss the importance of being able to communicate by the written word.

- If students have difficulty stating ideas clearly:

  – Suggest they have their thoughts organized before they begin writing.

  – Review the information noting the key words and ideas.

  – Discuss the importance of stating the ideas clearly.

  – Instruct them to use simple concise words.

- If students have difficulty using complete sentences, remind them to check for a subject and a verb (that is singular or plural to agree with the subject), and a predicate that completes the verb, if it is needed to complete the idea.

- If students have difficulty proofreading and editing:

  - Direct them to read slowly and carefully for meaning, punctuation, spelling, and capitalization.

  - Suggest that they take out any unneeded sentences, phrases, words, or punctuation.

  - Have them read the letter backwards to look for misspelled words.

- If students have difficulty analyzing/synthesizing information:

  - Remind them that to analyze they must break the information down into all its component parts in order to understand it.

  - Remind them that to synthesize information they should put all the component parts together in a way that makes the information usable.

- If students have difficulty identifying/analyzing underlying causes, discuss cause-effect relationships and explain that underlying causes are basic, fundamental causes. An underlying cause may not be the most apparent cause, but becomes evident upon close inspection.

  EXAMPLE: Perhaps a grade was higher when studying with a friend and another grade was lower when studying at home because little brothers and sisters make so much noise that studying is difficult.

- If students have difficulty developing an action plan:

  - Instruct them to list their goals.

  - Discuss the steps necessary to attain the goals.

  - Instruct them to arrange the steps in a logical order.

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1, 2, and 3.

ASSIGNMENT SHEET 4

RECORD KEEPING

II

Name ______________________________ Score ____________

OBJECTIVE 8

Use a computer.

INTRODUCTION

Today, more and more records are being kept on computers. If you don't believe it, ask to see your family's financial records. Bank statements, bills, and investment statements will all be computerized. Your grades may be computerized. Mail is probably addressed to you by computer.

Data bases are computer programs that store different facts and arrange them in the order requested. For example, a department store's data base might include customer names, addresses, account numbers, items purchased, amounts due, date last payment was made, and charge account limits. Monthly bills will also include some of this information. When the store wants to send catalogs to all customers who bought lawn mowers last year, other information will be used. When the store wants to reward its best customers with special coupons, still different information will be used. In this exercise, you will use a computer database.

DIRECTIONS

Research and Reference Skills
- Use computer data base

Functional Reading Skills
- Follow written instructions

You will need an IBM or compatible computer and at least 8-12 tests you have recently taken.

NOTE: You might want to bring your own disk. You can copy the program and use it at home and keep your data bank current for several years. The information can help you improve your test scores throughout high school and beyond.

1. Insert diskette. Turn on the computer. (This will automatically start AGSTUDY.) If the computer is already on, insert diskette, type "AGSTUDY" and enter.

   NOTE: How a computer is turned on and how a program is selected depends on the computer, the software, and how the system is set up. Follow your teacher's instructions carefully.

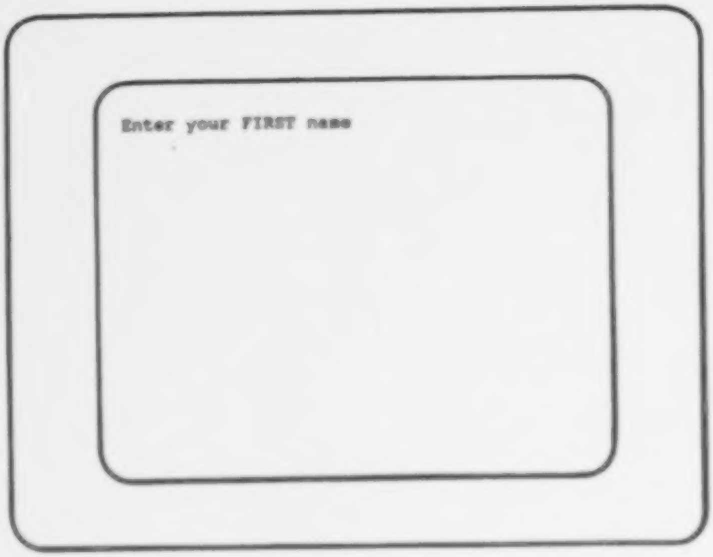
2. A series of screens will appear, telling you about the program. Press ENTER, as directed by the computer.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Composition Skills
- Use complete sentences
- Proofread & edit

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues
- Analyze/synthesize information
- Identify/analyze underlying assumptions
- Develop an action plan

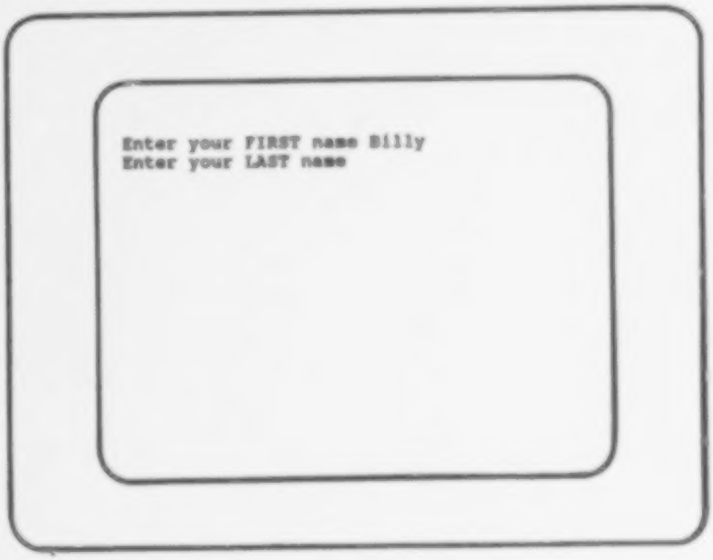
3. When the screen shows:



```
Enter your FIRST name
```

Type your first name and press ENTER.

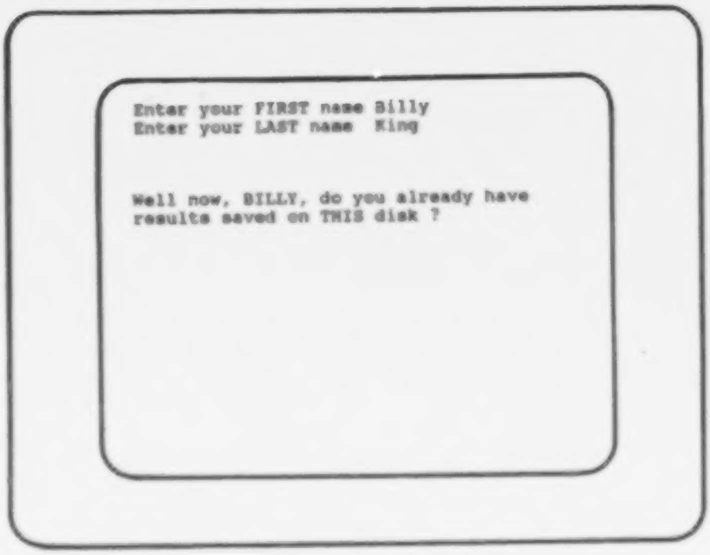
4. When the screen shows:



```
Enter your FIRST name Billy
Enter your LAST name
```

Type your last name and press ENTER.

5. When the screen shows:



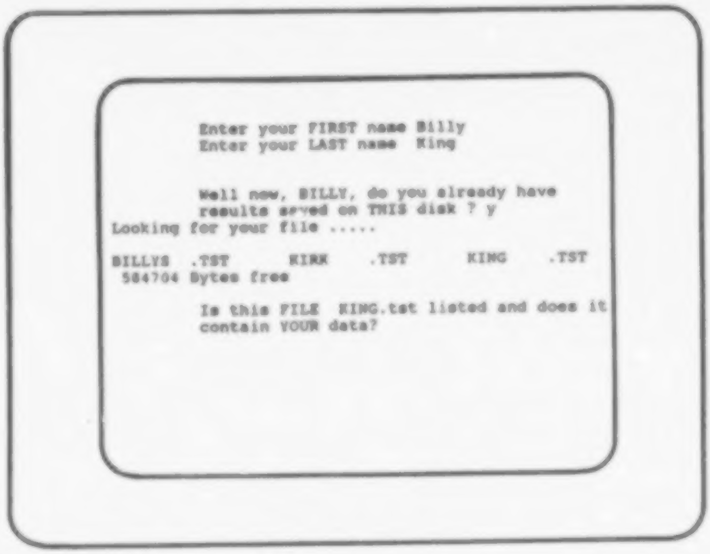
```
Enter your FIRST name Billy
Enter your LAST name  King


Well now, BILLY, do you already have
results saved on THIS disk ?
```

Type NO and press ENTER.

NOTE: If you have already added information once, type YES and press ENTER. The computer will ask you to confirm your file name, then continue.

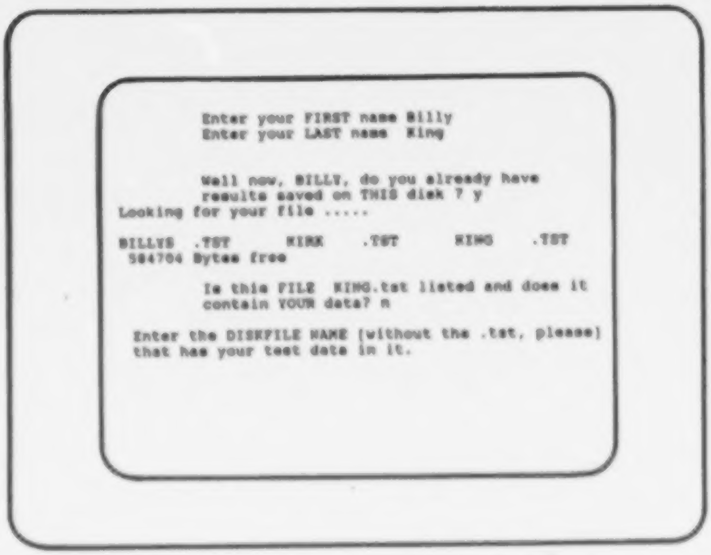
NOTE: You can type N for no and Y for yes.

6. If Yes the screen will look like this:



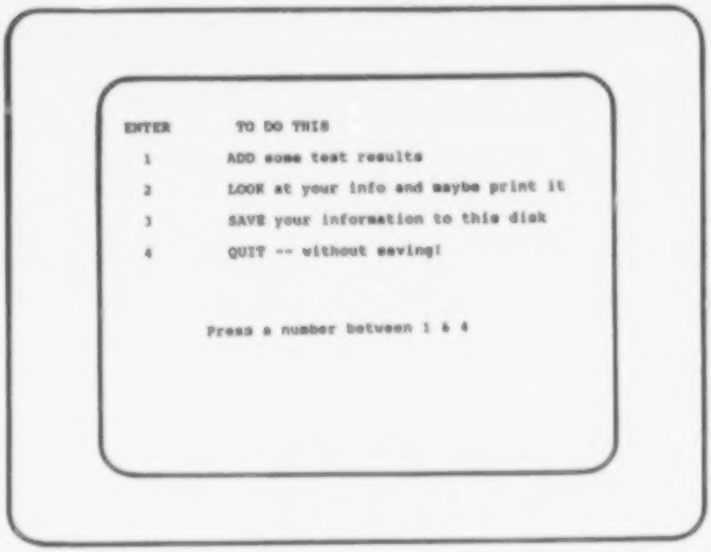
```
        Enter your FIRST name Billy
        Enter your LAST name  King


        Well now, BILLY, do you already have
        results saved on THIS disk ? y
Looking for your file .....

BILLYS  .TST      KIRK    .TST      KING    .TST
 584704 Bytes free

        Is this FILE  KING.tst listed and does it
        contain YOUR data?
```

If you answer N to this question, this screen appears:



```
        Enter your FIRST name Billy
        Enter your LAST name  King


        Well now, BILLY, do you already have
        results saved on THIS disk ? y
Looking for your file .....

BILLYS  .TST      KIRK    .TST      KING    .TST
 584704 Bytes free

        Is this FILE  KING.tst listed and does it
        contain YOUR data? n

 Enter the DISKFILE NAME [without the .tst, please]
 that has your test data in it.
```

Enter the filename that does contain the data and press ENTER. This screen will appear. (This same screen appears if you answered N to the question, "Do you already have results saved on this disk?")



```
ENTER       TO DO THIS

  1        ADD some test results

  2        LOOK at your info and maybe print it

  3        SAVE your information to this disk

  4        QUIT -- without saving!


       Press a number between 1 & 4
```

Choose a number between 1 & 4 and enter it.

1 ADD lets you enter new information and add it to your data base.

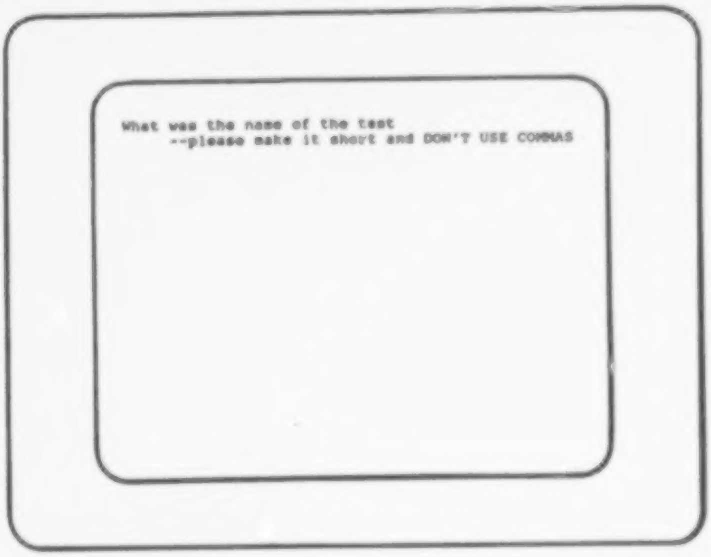
2 LOOK lets you see the information you have entered and compare test factors and results. It also lets you print out the information in your data base.

3 SAVE stores your information into memory. If you already have information in the computer, the new information is added to it.

4 QUIT lets you exit the program. If you have not saved the information you added, it will be lost, but information you added during previous computer sessions will be unchanged.

Choose the ADD option 1 by pressing 1, then ENTER.

7. The screen will show:



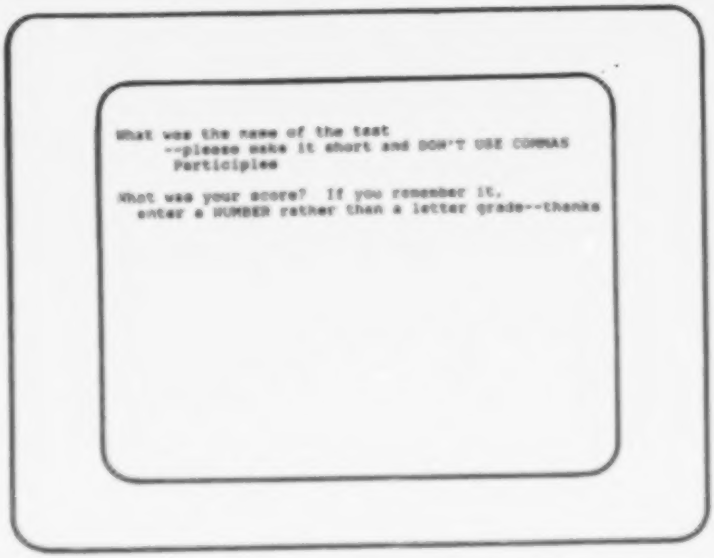
```
What was the name of the test
      --please make it short and DON'T USE COMMAS
```

Enter what you need to identify the test. Use abbreviations. For example, the history test you took on April 3 that covered the Civil War might be titled:

Hist.CivilWar
Hist4-3
3rdHr.CivilW

or anything else that will be clear to you. Limit the length of the name of the test to 15 or 16 letters, numbers, and spaces. When you have the title entered, press ENTER.

8. Now the screen will show:



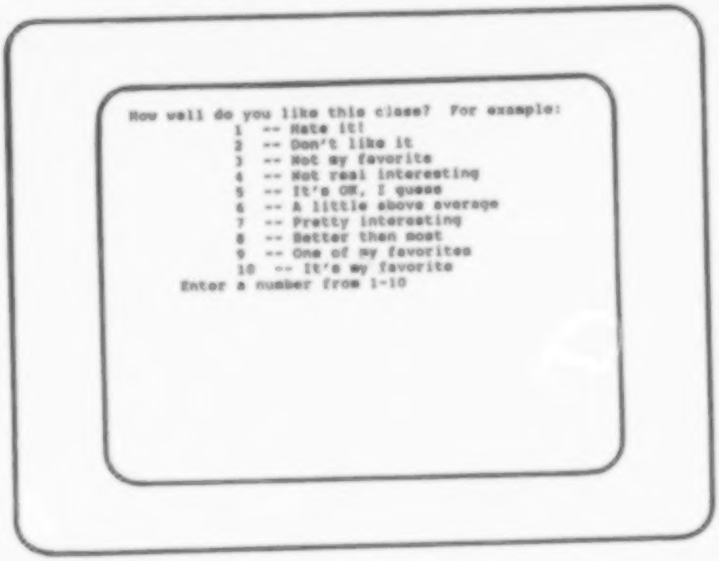
```
What was the name of the test
      --please make it short and DON'T USE COMMAS
       Participles

What was your score?  If you remember it,
  enter a NUMBER rather than a letter grade--thanks
```

Type your grade. If you only got a letter grade, use this scale:

A = 95
B = 85
C = 75
D = 65
F = 30

Press ENTER.

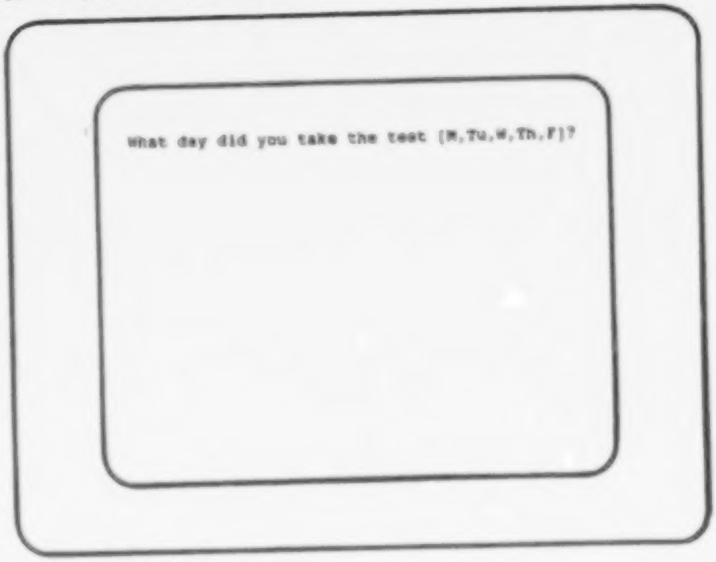
9. The screen will show:



```
How well do you like this class?  For example:
            1   -- Hate it!
            2   -- Don't like it
            3   -- Not my favorite
            4   -- Not real interesting
            5   -- It's OK, I guess
            6   -- A little above average
            7   -- Pretty interesting
            8   -- Better than most
            9   -- One of my favorites
            10   -- It's my favorite
     Enter a number from 1-10
```

Type the number that best describes about how you feel about the class. Don't think about it a long time, just type what comes to your mind first. Then press ENTER.

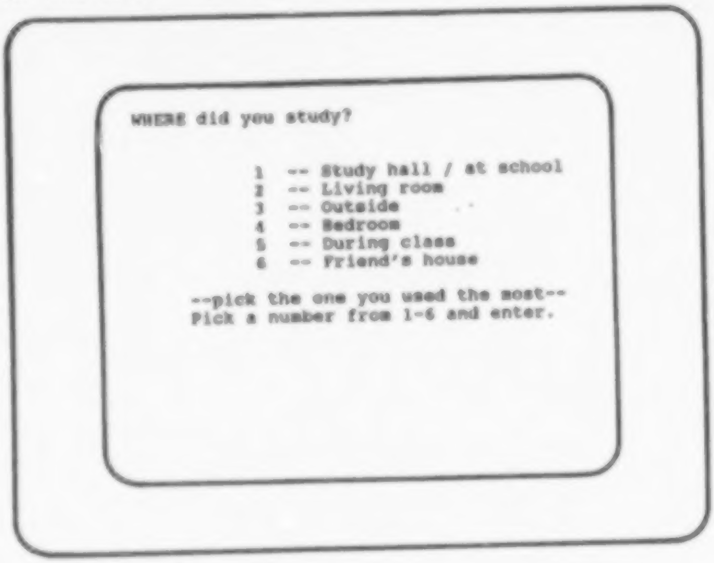
10. The screen will show:



```
What day did you take the test [M,Tu,W,Th,F]?
```

Type the day, then ENTER.

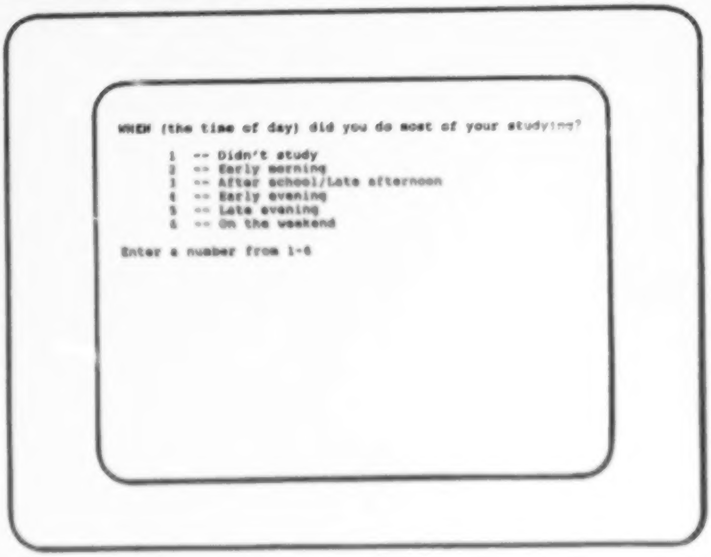
11. The screen will show:



```
WHERE did you study?

            1  -- Study hall / at school
            2  -- Living room
            3  -- Outside
            4  -- Bedroom
            5  -- During class
            6  -- Friend's house

     --pick the one you used the most--
     Pick a number from 1-6 and enter.
```

Type the number, then press ENTER.

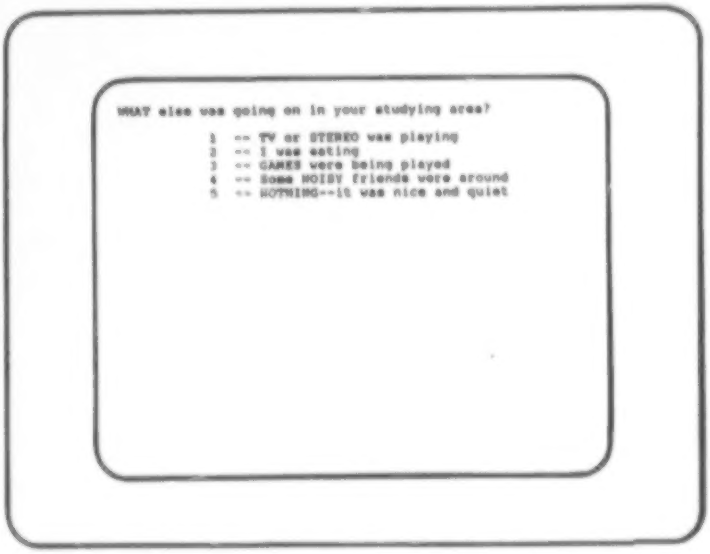
12. The screen will show:



```
WHEN (the time of day) did you do most of your studying?

      1  -- Didn't study
      2  -- Early morning
      3  -- After school/Late afternoon
      4  -- Early evening
      5  -- Late evening
      6  -- On the weekend

Enter a number from 1-6
```

Type the number that best describes when you studied. If more than one applies, choose the one describing when you got the greatest amount of studying done. Press ENTER.

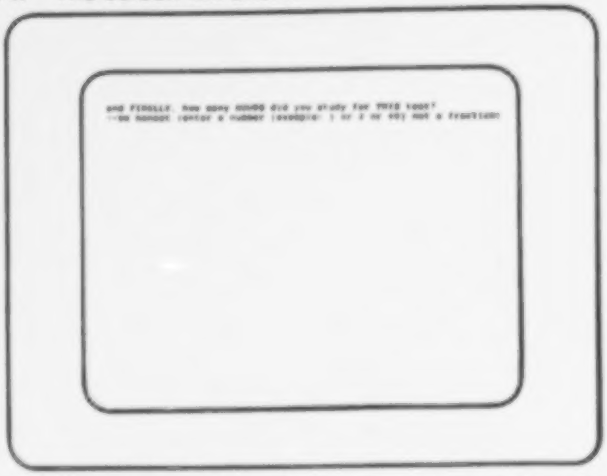
13. The screen will show:



```
WHAT else was going on in your studying area?

           1  -- TV or STEREO was playing
           2  -- I was eating
           3  -- GAMES were being played
           4  -- Some NOISY friends were around
           5  -- NOTHING--it was nice and quiet
```

Type the number that best describes what was going on. If more than one is correct, enter the one that is most correct. For example, if you were eating and listening to TV, but were really paying more attention to the TV than your textbook, enter that the TV was on. If you were trying to study at the dinner table, though, enter that you were eating. Press ENTER.

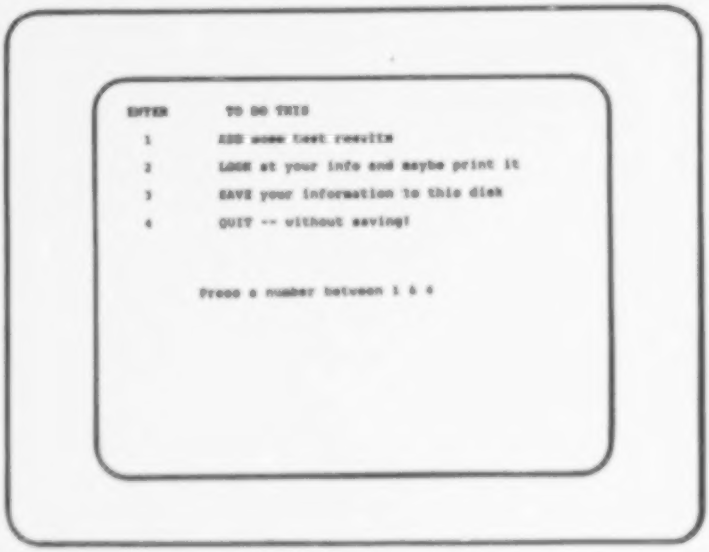
14. The screen will show:



```
and FINALLY, how many HOURS did you study for THIS test?
--be honest (enter a number (example: 1 or 2 or 10) not a fraction)
```

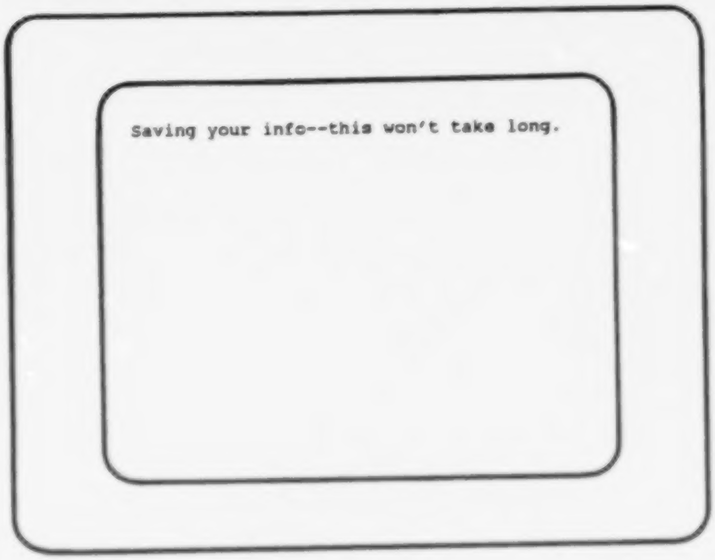
Enter the number of hours you studied. Don't try to allow for other things. If you laid in front of the TV and watched a show, but only spent 10 minutes really studying, enter the time you laid in front of the TV, too. If you spent less than an hour studying, enter 1. Press ENTER.

15. The screen will return to:



```
ENTER        TO DO THIS

  1          ADD some test results

  2          LOOK at your info and maybe print it

  3          SAVE your information to this disk

  4          QUIT -- without saving!


          Press a number between 1 & 4
```

Choose the SAVE option by pressing 3 then ENTER. The screen will show:



```
Saving your info--this won't take long.
```

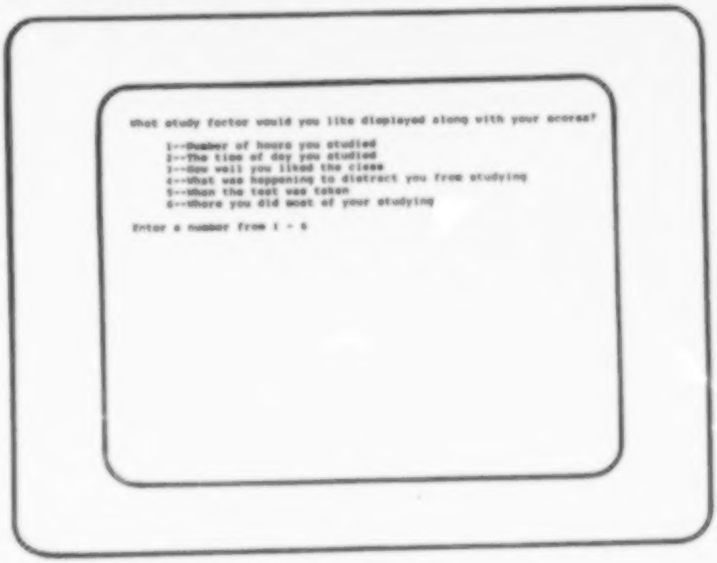
Press enter to return to the menu.

16. To leave the program, choose option 4 by pressing 4 then ENTER.

17. As you study this unit, enter all your test scores on your data base.

18. To complete this assignment sheet, enter the program and select option 2, LOOK, by pressing 2 then ENTER.

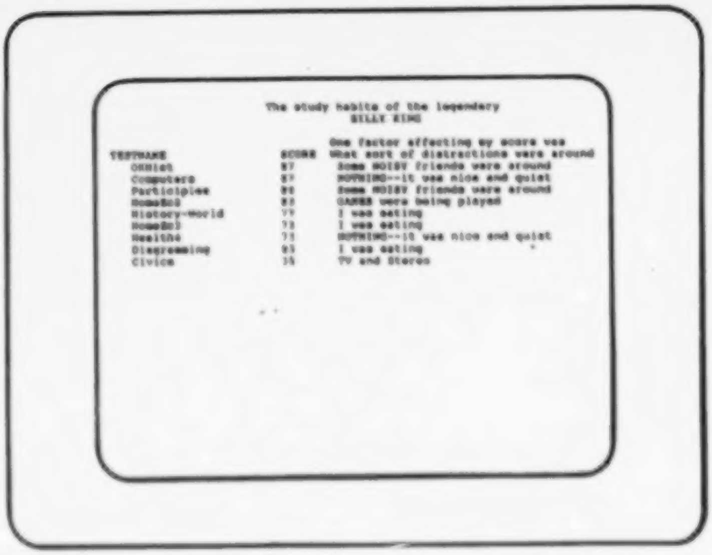
19. The screen will show:



```
What study factor would you like displayed along with your scores?

     1--Number of hours you studied
     2--The time of day you studied
     3--How well you liked the class
     4--What was happening to distract you from studying
     5--When the test was taken
     6--Where you did most of your studying

Enter a number from 1 - 6
```

Select a factor, then press ENTER.

The screen will show all your test scores and the factor like this:



```
                 The study habits of the legendary
                             BILLY KING

                                  One factor affecting my score was
TESTNAME                    SCORE What sort of distractions were around
   Ohmist                    87     Some NOISY friends were around
   Computers                 87     NOTHING--it was nice and quiet
   Participles               85     Some NOISY friends were around
   HomeEc1                   83     GAMES were being played
   History-World             77     I was eating
   HomeEc3                   73     I was eating
   Healths                   71     NOTHING--it was nice and quiet
   Diagramming               65     I was eating
   Civics                    35     TV and Stereo
```

Note any trends you see. For example, the scores above all improved with increased study time. View all the different factors.

- To view a different factor without printing any out, type N or NO, then press ENTER.
- To print a document before going on the next factor, type Y or YES, then press ENTER.

20. Choose the two factors most clearly related to your grades. Note what you do that improves or hurts your grade. Print those factor screens.
21. Write a brief essay analyzing your findings and describing what you can do to improve your test scores. Use correct grammar, punctuation, and spelling. Proofread your essay before you turn it in.
22. Turn the printouts and your essay in to your teacher.

SUGGESTED
EVALUATIVE CRITERIA

1.	Two printouts listing the data for at least 8 tests	50 points
2.	Thoughtful analysis of data	15 points
3.	Plan to improve test scores	15 points
4.	Correct spelling, grammar, and punctuation	10 points
5.	Neatness	10 points
	TOTAL	100 points

ASSIGNMENT SHEET 5

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, creative thinking/problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Gaining factual information
- Using audiovisual media
- Using magazines and newspapers
- Following written instructions

WRITING SKILLS

- Completing forms and records

MATHEMATICS SKILLS

- Calculating with whole numbers
- Calculating with decimals
- Collecting/recording data
- Solving income/expense problems
- Preparing a budget
- Determining income tax

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues
- Creating a finished product

EMPLOYABILITY SKILLS

- Mastering specific job task/procedure

- Emphasize to the students that criteria for grading their assignment will include all of the following:

  1. Research (accuracy in pricing car, tags, insurance, etc.)
  2. Correct math calculations
  3. Realistic statement of expenses (savings, spending money, expenses)
  4. Feasibility of budget (budget should meet goals of assignment)
  5. Neatness

- If students have difficulty preparing a budget:

  - Discuss the importance of budgeting.
  - Review the goals of a budget.
  - Review the terminology used in a budget.
  - Review math skills.
  - Determine which area of preparing a budget is causing difficulty and review the skills required for that area.

- If students have difficulty determining income tax:

  - Remind them that this is a necessary skill in life.
  - Stress the fact that determining income tax requires adequate math skills.
  - Review the formula for determining income tax.

- If students have difficulty analyzing/synthesizing information:

  - Remind them that to analyze they must break the information down into all its component parts in order to understand it.

  - Remind them that to synthesize information they should put all the component parts together in a way that makes the information usable.

- If students have difficulty creating a finished product:

  - Review the information.

  - Instruct them to examine the goals of the assignment.

  - Instruct them to work one step at a time until the project is finished.

  - Suggest they write a plan for attaining their goal.

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1, 2, and 3.

ASSIGNMENT SHEET 5

RECORD KEEPING

Name ______________________________ Score ____________

OBJECTIVE 9

Build a budget to buy a car.

INTRODUCTION

Every teenager has the same dream: "When I turn 16, I'll get a car. My own car. It will be so sharp."

But, time to face reality. Cars cost money. How can you make sure you have enough money to buy the car of your dreams? The first step is preparing a budget. That's right! Planning ahead and saving money are your best bets.

DIRECTIONS

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Use audiovisual media
- Use magazines and newspapers

Functional Reading Skills
- Follow written instructions

Functional Writing Skills
- Complete forms & records

1. Choose the car of your dreams. If you know the car of your dreams is going to be out of your reach, choose a car you think you might be able to buy when you turn 16. Use television ads, newspaper ads, or visit an auto showroom to determine the cost of the car. Be sure you know the total price, including tags, taxes, title, and insurance.

2. Pretend you have just been hired at a fast food restaurant. You will work 20 hours a week for $4.25 per hour. Assume your parents will let you use your earnings to buy the car, but require you to put any money you already have in savings for college. They also require you to put money you get as Christmas and birthday gifts in the bank.

3. List your expenses. When you get paid, you will find that several things have been taken out of your check. For 20 hours work at $4.25, expect to see the following withholdings:

FICA	$6.50
Federal Income Tax	$5.00
State Income Tax	$ .25

You may have to buy your own school lunches or pay for Christmas presents. Your parents may require you to put a percentage of your income into savings for college; or you may have some set expenses, such as membership in a health club, or magazine subscriptions. Other expenses are averages set aside for your lifestyle. For example, if you take a date to the theater every Friday, you might plan on saving $15.00 every week for Friday nights.

HOW MANY HOURS?

High school students may work as much or as little as they want. Most businesses will work around school-related responsibilities, but that means you won't earn as much. For example, if you play football, during football season you may only be able to work 5-10 hours per week.

Some schools offer on-the-job learning programs, such as DECA, where students spend part of their school day working. Other programs, such as JTPA, offer summer employment and class time. Students participating in JTPA are paid an hourly rate for both work and school hours. If you are interested in working, remember that you must be 16 for most jobs. Contact your school's guidance counselor for more information on programs and employment opportunities in your area.

Gross income (hours worked x $4.25) ______

Withholding:

FICA ______

Federal Income Tax ______

State Income Tax ______

Set expenses:

(List every expense, including spending money.)

____________________ ______

____________________ ______

____________________ ______

____________________ ______

____________________ ______

____________________ ______

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with decimals

Data Analysis and Display Skills
- Collect/record data

Functional Math Skills
- Solve income/expense problems
- Prepare a budget

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues
- Create a finished product

Job Acquisition/Development Skills
- Master specific job task/procedure

Other expenses:

______________________ ______

______________________ ______

______________________ ______

______________________ ______

______________________ ______

______________________ ______

______________________ ______

______________________ ______

______________________ ______

______________________ ______

Total monthly expenses ______

4. Subtract monthly expenses from income.

Total monthly income ______

Total monthly expenses ______

5. How much can you save each month for your car? ______

6. How many months will it take you to buy the car? ______

IT AIN'T OVER WHEN IT'S OVER

You finally saved enough to buy the car! Congratulations! Now you have it all: wheels, a job, and money to burn, right? Think again. Once you have a car, you also have all the bills that go with it: gasoline, maintenance, insurance, tags, title fees, etc. Ask your parents how much they spend each month to operate their cars. As a class, find out how much it would cost a 16 year old to maintain a car if he drives 5 miles each way to school, 7 miles from school to work, and 4 miles from work to home. Add mileage for pleasure driving. Which costs more: saving for your car or maintaining it afterwards?

SUGGESTED
EVALUATIVE CRITERIA

1. Research (accuracy in pricing car, tags, insurance, etc.) .... 20 points
2. Correct math calculations .... 20 points
3. Realistic statement of expenses (savings, spending money, etc.) .... 20 points
4. Feasibility of budget (budget should meet goals of assignment) .... 30 points
5. Neatness .... 10 points

ASSIGNMENT ANSWERS

RECORD KEEPING *II*

ASSIGNMENT SHEET 1	Answer sheet should include accurate information and calculations
ASSIGNMENT SHEET 2	Content of the notes should not be graded. Rather, the fact that notes were or were not taken, their organization or lack of it, and the use of suggested methods, should be reflected in the grade.
ASSIGNMENT SHEET 3	The register should be complete. No noticeable amount of time should be missing. Totals should be correctly calculated.
ASSIGNMENT SHEET 4	Students should complete entries of a reasonable number of tests. Clear trends should be evident in the printouts turned in and the description should be appropriate to the trends identified.
ASSIGNMENT SHEET 5	The budget must meet the goals of the student. The budget should allow realistic spending money, savings, and expenses. The totals should be correctly calculated.

WRITTEN TEST

RECORD KEEPING

II

Name ______________________________ Score __________

OBJECTIVE 1

Match terms associated with record keeping to their definitions. Write the correct letter in the blank.

Part I

_____ 1. The amount found by adding all amounts and dividing by the number of amounts added

_____ 2. A file of income and expenses

_____ 3. A computer program that saves pieces of information and arranges them as needed

_____ 4. Money owed

_____ 5. A document showing everything that has happened in an account during the last month or quarter

_____ 6. A document showing time worked and not worked

_____ 7. A list of what is owned

_____ 8. The set of documents that record or prove a series of events

_____ 9. A written record of activities

a. data base

b. liabilities

c. program

d. medium

e. average

f. journal

g. bill of lading

h. ledger

i. certificates

j. statement

k. legend

l. warranty

m. inventory

n. paper trail

o. time sheet

May be photocopied for student use.

Part II

_____ 1. A document listing what has been ordered, the cost of the items, the date of the order, and other information; an order form

_____ 2. Money you have, investments you have made, and anything you own that is of value; what you are worth

_____ 3. Income minus expenses

_____ 4. A record of all charges, expenses, payments, and adjustments related to a person, project, or business

_____ 5. A set of related information or notes stored and used together

_____ 6. Money earned or given to you

_____ 7. Money spent

_____ 8. A document that proves something, usually money, has been received

_____ 9. A written document telling or proving something that has happened

a. profit

b. receipt

c. savings

d. file

e. sales

f. received

g. expenses

h. account

i. taxes

j. record

k. investment

l. assets

m. income

n. invoice

o. bonds

May be photocopied for student use.

OBJECTIVE 2

List reasons for keeping good records. Write four reasons in the space below.

1. ______________________________

____

2. ______________________________

____

3. ______________________________

____

4. ______________________________

____

OBJECTIVE 3

List records you may need to keep. Write two records for each of the areas.

At work:

1. ______________________________

2. ______________________________

At school:

1. ______________________________

2. ______________________________

At home:

1. ______________________________

2. ______________________________

For personal information:

1. ______________________________

2. ______________________________

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190

OBJECTIVE 4 **Complete math problems associated with record keeping.**
Using the information below, work the math problems below.

Jerry Jones

Income	
Allowance	$10.00
Baby sitting	$20.00
Birthday present	$10.00
Expenses	
New compact disk	$12.34
Movie Friday night	$ 7.50
Savings	$ 5.00
Soft drink	$ .72
T-Shirt	$ 8.64

1. What is Jerry's total income? __________

2. What are Jerry's total expenses? __________

3. What is Jerry's average of the expenses? __________

4. If his income for the whole year is $300.00, what percent of the year's income did Jerry receive this week? __________

May be photocopied for student use.

5. Jerry received $25.00 the week before and $22.00 the week after. Draw a graph of his three weeks' incomes.

NOTE: Objectives 5-9 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

RECORD KEEPING

II

OBJECTIVE 1

Part I

1.	e	6.	o
2.	h	7.	m
3.	a	8.	n
4.	b	9.	f
5.	j		

Part II

1.	n	6.	m
2.	l	7.	g
3.	a	8.	b
4.	h	9.	j
5.	d		

OBJECTIVE 2

Answer should include any four of the following:

- To organize information and make it easier to use
- To meet requirements
- To prove what happened
- To make comparisons
- To save time
- To make decisions

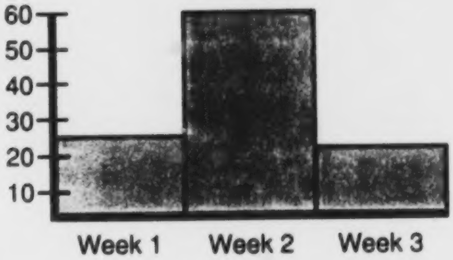
OBJECTIVE 3

Answers should include any two documents legitimately used in each of the four areas. Answers should not be limited to what is included in the unit or to what is discussed in class.

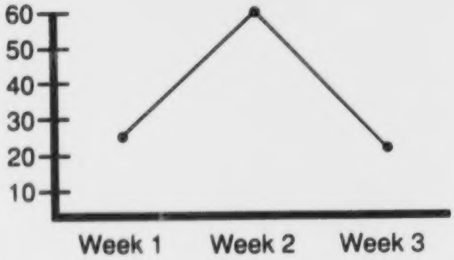
OBJECTIVE 4

1.	$40.00
2.	$34.20
3.	$6.84
4.	11.4%

5.


60
50
40
30
20
10
Week 1
Week 2
Week 3

or


60
50
40
30
20
10
Week 1
Week 2
Week 3

OBJECTIVE SHEET *AGRICULTURAL COMMUNICATION* *III*

INTRODUCTION

Stand very still. For one second try not to do anything at all. Time's up. Did you succeed? No, of course not. Doing nothing–even only for one second–is impossible.

Think of all the things you were doing during that second: you continued to circulate blood, your brain sent and received messages about not moving or breathing, you produced new cells, and digested food. While you were doing nothing, you were experimenting, following directions, and participating. And the whole time you were communicating. That's right. Just by standing there doing nothing, you were sending and receiving messages.

For example, if you closed your book and consciously tried to do nothing, you communicated that you were paying attention to what you were reading and trying to learn. If you screwed up your face and did nothing for a very long second, you communicated that you wanted to have some fun. If you skimmed over the paragraph and did not pause, you communicated that you didn't want to waste your time on the experiment.

That is the nature of communication. It is as much a part of your life as breathing. Like breathing, we communicate unconsciously, but we can control it and use it to our advantage. By knowing about communication, you will have a powerful tool that will let you send the messages you want to send and receive messages more clearly.

UNIT OBJECTIVE

After completing this unit, the student will be able to recognize types of communication and media, the importance of good communication, and its effect on agriculture. The student will also be able to distinguish between facts and opinions, and present and support a point of view. The student will demonstrate these skills by completing an assignment sheet, a job sheet, a practical test, and a written test with a minimum of 85% accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with agricultural communication to their definitions.
2. Distinguish between verbal and nonverbal communication.
3. Discuss why good communication skills are important.

4. Select from a list types of media.

5. Choose the word or phrase that completes statements about modern communication technology.

6. Select from a list true statements about the effects of international communications on agriculture.

7. Label elements in communication organization structures.

8. Distinguish between facts and opinions.

9. Write a letter of request and a thank-you letter. (Assignment Sheet)

10. Present a speech giving your opinion. (Job Sheet)

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.

- Invite radio, newspaper, and television broadcasters, reporters, and managers to discuss the importance of the media to agriculture.

- Invite your local county extension agent, soil conservation service representative, or forest service worker to discuss how communication is used in their jobs.

- Invite a local farmer, rancher, implement salesperson, crop duster, or other person employed in agriculture to discuss types of media they use and the importance of the media in their jobs.

- Make arrangements for students to visit some of the following:

  - Television station
  - Radio station
  - Newspaper office
  - Magazine or book publishing company
  - Desktop publishing business

  - Computer center or showroom with links to a computer bulletin board (may be available in your school or at a local business)

  - Commodities broker

- Arrange to have all materials and supplies necessary to complete the assignment sheet and job sheet.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with agricultural communication to their definitions.

- Introduce the unit by inviting students to list or bring examples of communication.

- Students will be very familiar with some terms used in this unit. Other terms may be familiar, but not well understood, such as "FAX" or "media." Still others, such as "noise" or "verbal," will have slightly different meanings in this unit. Be sure all terms are clearly understood and add to the terms and definitions list if necessary.

- Throughout the unit, stress that communication is important in any career, in school work, and in personal life. Give a variety of examples to illustrate this fact.

Objective 2: Distinguish between verbal and nonverbal communication.

- Have students list as many examples of each as possible.

- Have students play charades or "Win, Lose, or Draw" to illustrate the use of nonverbal communication.

- Invite an artist, musician, or counselor to discuss the importance of nonverbal communication.

- Write a script for a job interview. Have students act out the scene, reading from the script, thereby using the same words, but exhibiting different attitudes, such as anxiety, dislike for the job, eagerness, etc.

- Have students watch television commercials and select the verbal and nonverbal communication in each. Have them compare how each is presented and what each contains. For example, a car commercial might have a person describing the car and some details written on the screen. These verbal communications might be specific (miles per gallon, price, warranties, options) and detailed. At the same time, the screen might show pictures of the car cruising through a beautiful countryside, speeding down the street, or attracting the attention of pretty girls. These nonverbal communications are less specific, but might more clearly describe why a person would choose that car.

- Have students watch their own conversations and describe times that verbal and nonverbal communication seem to contradict each other. For example, their parents might say "That's nice, Dear," without really taking an interest in the conversation.

- Have students view music videos to see how the verbal and nonverbal communications support each other.

- Have students look at posters or book covers. Without reading words or titles, have them suggest what the poster or book is about and whether or not they would be interested in reading more. Have them list the nonverbal communications in each example.

- If your students watch comedians regularly, have them compare the verbal and nonverbal communication used. Old Marx Brothers movies or Red Skelton clips would be good examples of these uses.

- Have students choose a cartoon character and describe the nonverbal communication included in every drawing of the character. For example, Superman shows strength and determination, while Goofy shows, well, goofiness.

Objective 3: Discuss why good communication skills are important.

- Have students list times when good communication skills can be extremely helpful.

- Have students keep a running class list of times that poor communication has caused a problem.

- Invite your school counselor to discuss the importance of communication skills.

- Have students discuss family communication from their perspective, then from their parents' perspective. Show them books discussing how young people can improve communication with their parents and ask the students to comment on them. After they have discussed how their parents communicate with them, ask them what the students can do to improve family communication.

Objective 4: Select from a list types of media.

Objective 5: Choose the word or phrase that completes statements about modern communication technology.

- Have students list older forms of media and discuss why these are no longer used in America. Examples might include Pony Express riders, smoke signals, and town criers.

- It has been said that the printed word is dead and that in the future, books, magazines, newspapers, etc., will not be used. Have students debate whether or not this is true. Ask them if a printed computer screen is really different from a printed newspaper. If it is different, ask them to explain how.

- Have one of your school's history teachers discuss the importance of the media to history. Be sure to include the impact of Martin Luther's translation of the *Bible*, the impact which fliers such as *The Federalist Papers* had on the formation of our nation, and the impact the *Pentagon Papers* had on modern history.

- Have students discuss how current events are being shaped by the media. Ask if our government would be taking the same actions if there were no media.

- Take students to a newspaper office, radio station, or magazine/book publishing office.

- Take students to a desktop publishing office. Allow students to watch as a publication is being prepared.

- Make arrangements for students to send and receive a FAX.

- Take students to a computer center or showroom with access to a computer bulletin board. Have students enter information about what they are studying and ask bulletin board members to tell them what they think the importance of communication and the media is, how communication affects them, and how modern technology will affect communication and the media in the future.

- Have students write and film commercials for agricultural education. The first commercial should appeal to students who are already interested in agriculture, the second should appeal to students who are not interested in agriculture, and the third should encourage parents to support agricultural education in the schools. Have students prepare accompanying newspaper advertisements and radio spots. Send the advertisements to local media for use as public service announcements.

Software

- The American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605, 800-228-4689. The following are available:

  Micro-tutor Series Version 4.0 – Parliamentary Procedure. Includes review, test, and score-tracking. Helps recognize and apply parliamentary procedures. For use on Apple (order number AC504) and IBM-PC (order number AC604) systems.

  Parliamentary Procedure and FFA Review. Covers parliamentary procedures, competitions, and meeting management. For use on Apple II (order number HB962 for 5¼" disks; HB963 for 3½" disks), IBM-PC (order number HB964 for 5¼" disks; HB965 for 3½" disks), and MacIntosh (order number HB966) systems.

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- Keating, Bob. Managing Editor, Agricultural Press Services, Oklahoma State University, Stillwater, OK. Interview, October 1991.
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- *Project Learning Tree.* Western Regional Environmental Education Council: Boulder, CO.
- *Project Wild.* Western Regional Environmental Education Council: Boulder, CO.
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- Weissbert, Robert. *Understanding American Government.* Random House: New York, 1986.
- Zinn, Howard. *A People's History of the United States.* Harper and Row: New York, 1980.

DEBATE PROCEDURES

Debate is not the same as argument. Debate is the organized, controlled exploration of two points of view. Debate does not explore a problem, but rather, explores a proposed solution. Usually debate involves four speakers, two for the proposal (affirmative speakers) and two against it (negative speakers). Debates use two types of presentations: the constructive is used when the point of view is explained; and the rebuttal is used when points made by the other side are countered.

Usually one of two types of debate schedules are used:

Standard Constructive

First affirmative speaker (10 minutes)

First negative speaker (10 minutes)

Second affirmative speaker (10 minutes)

Second negative speaker (10 minutes)

Rebuttal

First negative speaker (5 minutes)

First affirmative speaker (5 minutes)

Second negative speaker (5 minutes)

Second affirmative speaker (5 minutes)

Oregon-Style Cross Examination

First affirmative speaker (8 minutes)

Cross-examination by second negative speaker (3 minutes)

First negative speaker (8 minutes)

Cross-examination by first affirmative speaker (3 minutes)

Second affirmative speaker (8 minutes)

Cross-examination by first negative speaker (3 minutes)

Second negative speaker (8 minutes)

Cross-examination by second affirmative speaker (3 minutes)

There are many other types of debate, with various time limits or arrangements.

May be photocopied for student use.

One other important thing to remember is that in debating, you might not always agree with the position you are assigned. Sometimes, you won't even know your position until the debate begins. The goal of debate is to strengthen your ability to support an argument, separate fact from opinion, recognize poor logic, and speak in public.

May be photocopied for student use.

PARTICIPATE IN A DEBATE

EQUIPMENT AND SUPPLIES

- Debate rules
- Watch or timer
- References and resources

PROCEDURE

1. Your instructor will assign you to either an affirmative or negative team. You will also have an assigned debate partner. Your debate will focus on the use of 120 acres of land.

2. Review the debate rules your teacher distributes.

3. Arrange with your partner to spend some time in the school or local library. Research your topic together. Keep notes just like those you prepared for the job sheet in this unit. You can find other information by checking in these references:

   - Card catalog
   - Encyclopedias
   - Almanacs
   - Yearbooks
   - *Readers' Guide to Periodic Literature*
   - *Winchell's Guide to Reference Books*
   - *Shore's Basic Reference Books*
   - *International Index to Periodicals*
   - *New York Times Newspaper Index*
   - *Black's Law Dictionary*
   - Congressional Record Indexes
   - *Statistical Abstract of the United States*
   - *Monthly Catalog of US Government Publications*
   - *Congressional Record*
   - *Congressional Digest*

4. With your partner, decide how you want to support your position. Arrange note cards in the order you believe they will be used.

5. Pretend you are the other side and list the points you think they will make. Use these to prepare your rebuttal.

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Select useful resources
- Locate resources

Functional Reading Skills
- Follow written instructions

Research Skills
- Take notes
- Use note cards

Oral Presentation Skills
- Make persuasive presentations
- Use good speaking techniques
- Select/use words effectively
- Use effective body language
- Present appropriate appearance

Listening Skills
- Apply active listening skills

Interactive Communication Skills
- Work effectively in a group

May be photocopied for student use.

General Relating Skills
- Participate in group activities

Teamwork/ Cooperative Skills
- Generate ideas

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues
- Analyze/synthesize information
- Draw conclusions
- Create a finished product
- Transfer knowledge/training to new situations

6. Practice your presentation. Ask your parents to pretend they are the opposing team or take turns with your partner pretending to be the opposing team.

7. Practice your arguments in front of a mirror and with a time clock. Remember that the same guides that apply to making a speech also apply to debating: look at your audience; don't say "uh;" stand still but not stiff; be prepared; have your notes ready; and make sure your appearance is neat and collected.

8. When time for the debate arrives, remember that this is not a contest, but an exchange of information. Do not become argumentative or angry. Present your facts and rely on them to prove your point.

May be photocopied for student use.

SPEECH EVALUATION SHEET

Student's Name ______________________________ Grade __________

Topic	Excellent	Good	Fair	Poor	Not Included
INTRODUCTION					
Got audience's attention	______	______	______	______	______
Clearly stated topic	______	______	______	______	______
Topic choice	______	______	______	______	______
CONTENT AND STRUCTURE					
Research	______	______	______	______	______
Main points were clear	______	______	______	______	______
Organized ideas logically	______	______	______	______	______
Summarized main points	______	______	______	______	______
Conclusion ended the speech clearly	______	______	______	______	______
DELIVERY					
Could be heard	______	______	______	______	______
Willingness to share with the audience (confidence)	______	______	______	______	______
Eye contact	______	______	______	______	______
Physical expressiveness (face, gestures, movement, ease)	______	______	______	______	______
Overall effectiveness	______	______	______	______	______
Subtotal	______	______	______	______	______
Excellent - 4, Good - 3, Fair - 2, Poor - 1, Not included - 0	x 4	x 3	x 2	x 1	
TOTALS	______	______	______	______	______

OBJECTIVE 1

Match terms associated with agricultural communication to their definitions.

- **communication** – the exchange of information, ideas, or opinions
- **fact** – what has actually happened or is actually true
- **feedback** – the response to a message
- **filter** – the values, beliefs, prejudices, and feelings that affect the messages we send and receive
- **media** – instruments for communicating with the general public
- **noise** – the effect of the environment on communication

  EXAMPLE: the need to be quiet in church
- **nonverbal** – communication without using audible words
- **opinion** – what one believes has happened or is true
- **verbal** – communication using words

OBJECTIVE 2

Distinguish between verbal and nonverbal communication.

There are two basic types of communication: verbal and nonverbal. Verbal communication is any type of exchange using words. Nonverbal communication uses everything but words.

> 90% of all communication is nonverbal.

Below are examples of verbal and nonverbal communication:

Verbal

Talking
Reading aloud
Writing
Singing words of a song
Cheering the football team
Yelling "Stop"
Saying "I Love You"
Saying "Oh no!"

Nonverbal

Humming
Sketches and drawings
Gestures and facial expressions
Instrumental music
Standing and raising your arms
Grunting or groaning
Slamming your fists
Blowing a kiss

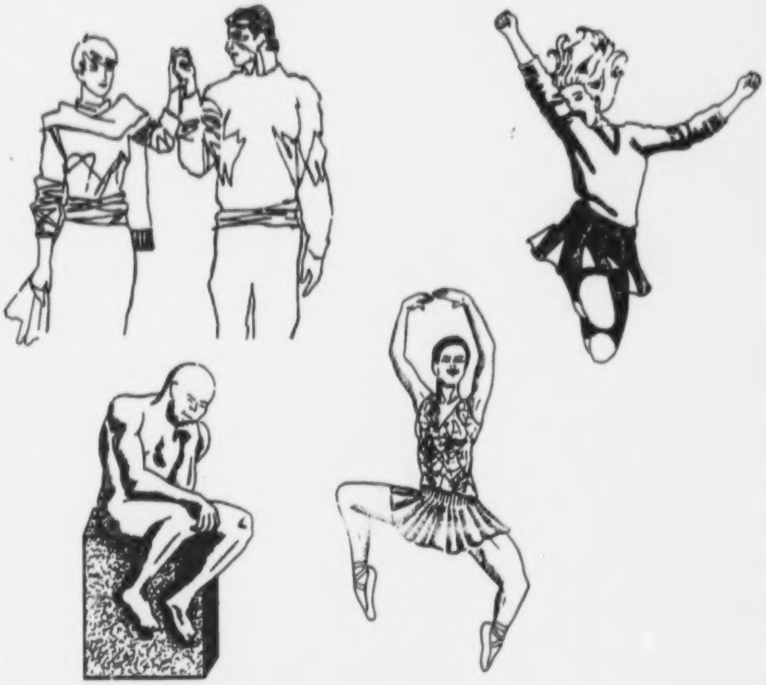
It is, of course, possible to stop communicating verbally, but almost impossible to stop communicating nonverbally. Nonverbal communication can be harder to interpret than verbal, but can also more honestly communicate the speaker's true feelings.

OBJECTIVE 3

Discuss why good communication skills are important.

Communication is the way we express how we feel, how we learn, and how we work with other people. Every career requires communication. Even a hermit, in leaving civilization and living in a cave, communicates that he doesn't want to be near other people.

WE COMMUNICATE IN MANY WAYS



Today, good communication skills are becoming more important than ever before. Susie Gammell, Personnel Supervisor at Express Services employment agency, says communication skills are "...very important. If a person can't read and write well, he can't even fill out the job application." She believes the ability to speak well is equally important, pointing out that employees have to complete an interview before being hired and also be able to work with others after they are hired. She also points out that computers are part of more jobs today and that a person has to be able to read and spell to operate a computer. She sees a definite trend: those who can communicate well and use a computer will get the better jobs.

Of course, communication is not just important because it is used at work. As long as you have a family or friends, you need to be able to communicate with them.

As a citizen you will need to be able to listen to what candidates, officials, and experts say and determine what their beliefs and views are. In daily life, you will need to be able to separate facts from opinions and come to your own conclusions.

Communication is part of every area of your life. The better your understanding of communication, the more you will be able to control and use the messages you send and receive.

OBJECTIVE 4 **Select from a list types of media.**

Media is the set of instruments used to communicate with the general public. Usually we connect media to news reporting, but media is not limited to news. Anything that is designed to send a message to the public is media, including:

- Newspapers
- Television
- Radio
- Billboards
- Magazines
- Books
- Yard signs
- Computer bulletin boards and networks

OBJECTIVE 5 **Choose the word or phrase that completes statements about modern communication technology.**

There was a time when nearly all verbal communication was through talking. Storytellers, bards (poets, songwriters), and town criers passed on history and news. Very few people could read or write. Most kings were brought up to be warriors, and many were unable to read, making their clerks very important.

Slowly, more people learned to read. When the printing press was invented, the printed word became available to the general public. As a result, society began to rely on it. When laws were passed requiring all children to attend school, reading and writing became even more important. Businesses assumed that all employees could read.

As technology progressed, convenience and speed became more important. Telephone calls replaced letters or telegrams. Television and motion pictures made spoken communication from experts, broadcasters, leaders, and stars part of everyday life.

Today, communication is undergoing another revolution. Just as the printing press revolutionized communication, the computer chip is changing communication today. As technology has progressed, convenience and speed have become more important. Computer technology has brought us cellular telephones, FAX machines, and pagers. Computers can send information from place to place or allow hundreds of employees to share the same files. This is called networking. The speed at which we are able to communicate with others is something no one could have imagined just a few years ago.

In the future, computer networking will be even more important. By the turn of the century, many experts believe our television, radio, printed media, telephone, and computer systems will all be included in one unit. A single connection will tie each home's system into a main system, much like a cable television system today.

Such a system would allow people to see and talk to each other and to look at documents or files at the same time. For example, if you were having trouble with a math assignment, you could call your cousin in Vermont, slide the document into your computer scanner, and both of you would see it on your computer screens. Anything your cousin wrote would appear on your screen. You could talk to him, solve the homework, and print out the finished work. Similarly, if you wanted to play computer games with someone in another state, or even another country, you could just dial a number. The game would show on both screens. National contests could be played with no one ever leaving home. School could be taught over the cable, with you and your teacher still able to see each other, talk to each other, and pass papers back and forth. .

Another change that will continue to revolutionize communication is miniaturization. Computers that filled entire rooms in the 1960s can now be carried in a notebook or briefcase. Cellular telephones that filled a small suitcase as recently as 1985, are now no larger than the handset of a regular telephone. Dick Tracy type wrist radios may be a reality in the near future.

Communications will also be much faster due to fiber optics, tiny glass rods tied together in a bundle or cable. Instead of magnetic pulses, sound waves, or other forms of transmission, fiber optics send light pulses. Light waves travel at a much higher frequency than sound waves (frequency is the speed at which pulses are transmitted). Light wave transmission has been considered for many years, but until technology could offer glass cables and laser use, fiber optics were not practical. Today they link computer systems, telephones, and television transmission networks, transferring even more information at a faster rate than earlier methods.

As computers have become smaller and communication links have improved, many new computer networks have been formed. One agriculture-based network is the Data Transmission Network (DTN). It sends market information nationwide quickly and inexpensively, allowing farmers and ranchers to make accurate plans and informed decisions. Other networks allow farmers to sell their products on the commodities market– sometimes from computers in their tractors!

Satellite communications will also expand. One system proposed by Motorola, would feature 77 satellites in continuous orbit. The satellites would be positioned so that instant access to any point on Earth would be possible. This would allow calls and communications to follow each person. Every individual would have his or her own "telephone" number, and the calls would be directed to the person at home, in the car, at the mall, or in the field.

Personal telephone numbers will probably be used in Japan long before they are available in the United States. Why? Well, if every person has his or her own phone number, and a phone number for the FAX machine, and a business phone number, there simply aren't enough phone numbers to go around. This is already causing telephone problems. Each year several new area codes are added.

Another concern about personal telephone numbers is the lack of privacy. If the telephone can always know where you are, so can people you might want to avoid. Some groups have already organized to protest this technology on the grounds that it violates personal freedom. They have proposed compromises such as distributing a smart card (a credit card with a small microchip) that could be inserted into the telephone system if the person wants his calls to follow him.

There are still some communication challenges technology has not solved. For example, undersea communications are still limited. Radio waves will not penetrate water. The Navy has attempted to use Sonar with voice, lasers, and other methods of undersea communication, but none have produced clear communication with adequate range.

OBJECTIVE 6

Select from a list true statements about the effects of international communications on agriculture.

Today's world has been called a "global community." This means that what happens in one part of the world is more likely to affect people in another part of the world than in the past. Transportation and communication technology make talking with and visiting other places much easier. And that makes it possible to do business in other parts of the world.

As agriculture becomes more international, it is important for farmers and ranchers to know what is happening elsewhere in the world. For example, if another country begins producing large amounts of wheat, American farmers will lose some international sales and the price of wheat will fall. Similarly, if another country limits the amount of food that can be brought in from another country, prices here will be affected.

Farmers and ranchers use agricultural publications and computer networking to follow trends in foreign production, policies, and prices. This helps them make better decisions about future crops and sales.

New technologies, such as computers, help rural families keep in touch with the rest of the world. They quickly send farmers and ranchers information about farming, give them accurate weather forecasts, and link them with other rural families.

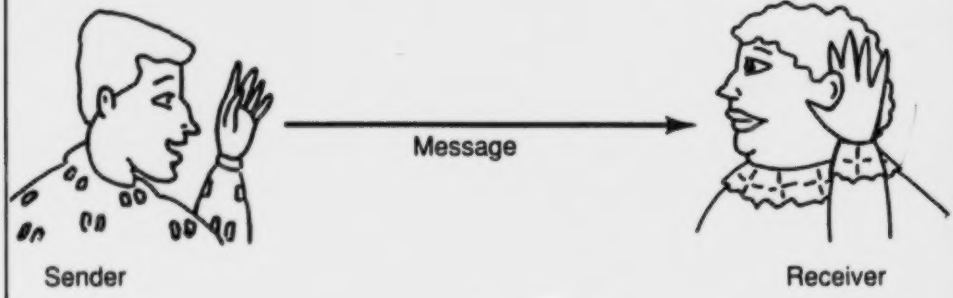
In some parts of America, telephone lines have still not been installed because installation is not cost effective for telephone companies. Farmers talk to the outside world via radio. Television is now available everywhere in the United States, but this was not true until almost 1990.

OBJECTIVE 7

Label elements in communication organization structures.

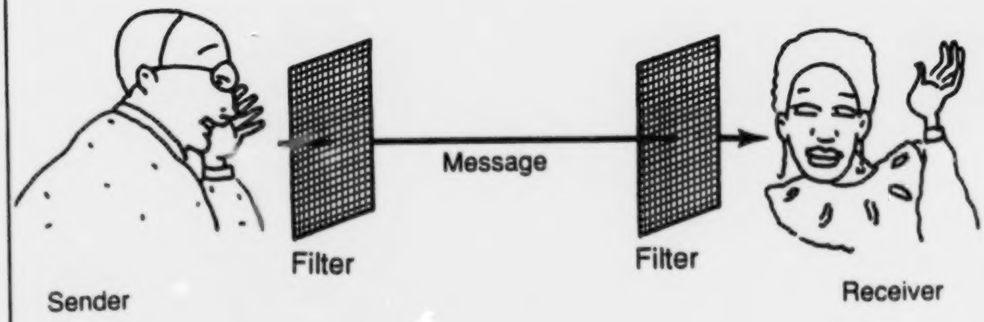
When you communicate, it may seem like the only things needed are two people and a message. Actually, there is a lot more involved. Let's start with the basics.

For any communication, there is a sender (the person sending the message) and a receiver (the person receiving the message). The message can include nonverbal, as well as verbal, signals.



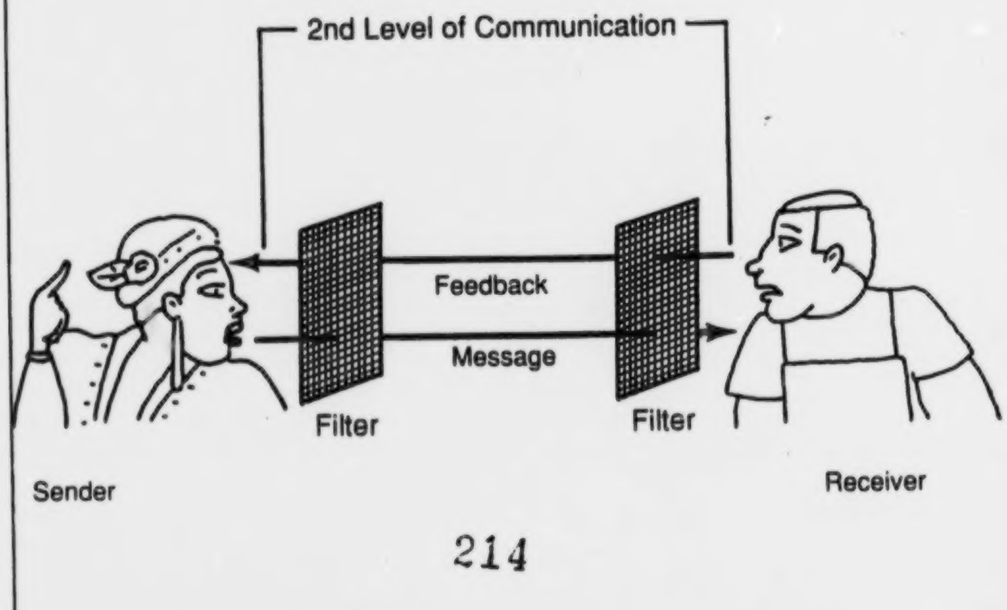
The message, as it goes from sender to receiver, goes through two filters, one for each person. Filters are the values, prejudices, feelings, and beliefs of each of the speakers.

Each person's beliefs, values, attitudes, and emotional and physical condition causes some parts of the message to get through but blocks others. This is called an encoding structure. The encoding structure works like a filter, allowing some messages to get through unchanged while others are altered in the process.

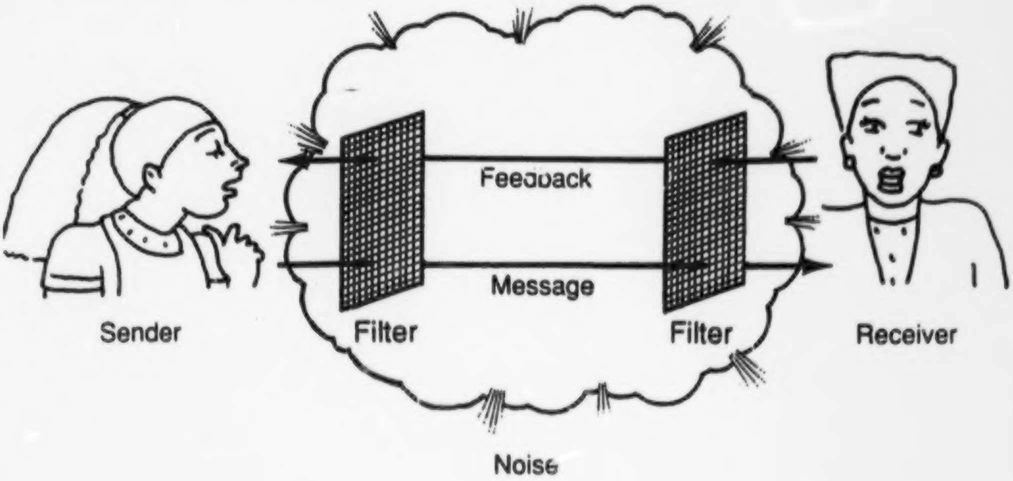

Filter
Message
Filter
Sender
Filter
Receiver

Filters are present in every conversation, but sometimes they cause special problems. Sometimes teenagers and their parents have trouble talking with one another, because the filters affect the messages. Some experts now label communication between men and women "cross-cultural" because the filters hold values that are so different, it is difficult to send a message through both filters without changing it.

When a message is finally received, the receiver sends a return message, called feedback. Like the initial message, both verbal and nonverbal signals are sent and the feedback has to pass through two filters.


2nd Level of Communication
Feedback
Message
Filter
Filter
Sender
Receiver

The whole time this exchange is taking place, noise affects the conversation. Noise, in this case, is not sounds, but is the effect of the place and time on the conversation. For example, a conversation in a car will be different than the same conversation in a crowded restaurant or over the telephone.



OBJECTIVE 8 **Distinguish between facts and opinions.**

As you filter messages you receive, one of the most important things to determine is "What is true?" Knowing what is true and what isn't, is not always easy. It is important to be able to tell fact from opinion.

Fact is something that has actually happened or is actually true. Opinion is something that is believed to be true, but may or may not be.

Fact	**Opinion**
Carol's shirt is red.	Carol's shirt is pretty.
Their sow took second place.	That sow is huge!
Mr. Jones is running for office.	Mr. Jones is working hard to be elected.
The X80-Zoom is the best-selling car today.	The X80-Zoom is the best car available today.
We used less herbicide this year.	We should not use so much herbicide.

Our lunch hour is only 20 minutes long.	Our lunch hour is too short.
John said he likes pizza.	Of course, John likes pizza.

To decide if something is fact or opinion, ask yourself if the sender has come to a conclusion. If he or she has, it is probably an opinion. It might be true, but it is still an opinion. If no conclusion has been drawn or if the speaker is simply repeating what has been proven, it is fact.

WHAT ABOUT LIES?

When is a fact not a fact? When it's a lie. Lies are misstatements of facts. For instance, if John said "I hate pizza," and you tell someone "John said he likes pizza," you have presented a fact, not an opinion. The fact isn't true, but it is still a fact.

INTRODUCTION TO ROBERT'S RULES OF ORDER

Has your family ever sat down to make an important decision and ended up talking all night without deciding anything? Or maybe you ended up fighting and arguing? If this has happened to you, then you know that trying to get a group of people to come to a decision they can all accept is not easy. Yet, this is exactly what many groups must do. From small clubs to our federal government, groups must find a way to explore an issue and reach an agreement.

Robert's Rules of Order is a handbook for parliamentary procedure. Parliamentary procedure is the set of rules used by a group as they carry out their business. Robert's Rules are used almost everywhere. These rules list the order in which things are done and the proper procedures for doing them.

According to Robert's Rules, a motion must be made and then seconded. Then it can be postponed or amended. The amendment can be amended, but must be accepted before the motion can be voted on. The motion can also be sent to committee or tabled (put aside to be considered at a later time). There are proper procedures for all of these actions and for other actions as well.

Knowing parliamentary procedure can give you real power; not knowing it can make it impossible for you to accomplish anything. In 4-H and FFA, as in other groups, meetings are frequently run according to Robert's Rules, especially large meetings and conferences.

SPEECH DIVISIONS FOR EIGHTH GRADERS

Public speaking and debate can be exciting hobbies. They require the ability to "think on your feet," construct logical arguments, research a variety of topics, and handle yourself with poise.

Many schools and youth organizations offer opportunities and competitions for public speaking and debate.

Your school probably offers public speaking courses. Many schools participate in speech and debate competitions with other schools. Contact your school counselor for more information about what your school offers.

FFA offers debate and public speaking competitions. Parliamentary procedures are used at many of their meetings, especially larger ones. Public speaking is often included in other projects. For example, livestock judging includes scoring the participant's ability to answer questions. For more information on FFA speech and debate training and competition, talk to your FFA Advisor.

Many other groups, such as the American Legion or the VFW, offer annual speech competitions. Winners in these events usually win money and a chance to compete at a higher level. These competitions are usually announced through your school office and in your local newspaper.

Judge's Score Sheet

Extemporaneous Speaking Contest -- Oklahoma FFA Association

Items to be Scored	Points Allowed	Points Awarded Contestants							
		1	2	3	4	5	6	7	8
1. **Content Related to Topic**	100								
2. **Knowledge of Subject** Importance and appropriateness of subject — Suitability of the material used — Accuracy of the statements included — Evidence of purpose.	100								
3. **Organization of Material** Organization of the content — Unity of thought — Logical development — Language used — Sentence structure — Accomplishment of purpose, conclusion.	100								
4. **Voice** Quality — Pitch — Articulation — Pronunciation — Force.	100								
5. a. **Stage Presence** Poise and body posture — Attitude — Confidence — Personality — Ease before audience.	50								
b. **Personal Appearance** Official FFA Dress	50								
6. **Power of Expression** Fluency — Emphasis — Directness — Sincerity — Communicative ability — Conveyance of thought and meaning.	200								
7. **General Effect** Extent to which the speech was interesting, understandable, convincing, pleasing, and captivating.	100								
8. **Response to Questions** Ability to answer the questions on the speech which are asked by the judges to indicate contestant's originality, familiarity with subject, and ability to think quickly.	200								
Total Points (Gross)	1000								
Less Time Deductions	1 pt./ second								
Total Points (Net)									
Rank of Contestant									

October 24, 1992
401 E. 8th
Anytown, Oklahoma 74074

American Farm Bureau Federation
Information Division
225 Touhy Avenue
Park Ridge, IL 60068

Dear Sir or Madame:

Please send me a copy of your booklet "Farm Facts." I understand there is a $2.50 fee for the booklet. A check in that amount is enclosed. I have also enclosed a SASE for your convenience.

Please contact me by phone at 123-456-7890 if any further information is needed.

Thank you for your help.

Sincerely,

John Doe

THANK YOU LETTER

TM 2

November 4, 1992
401 E. 8th
Anytown, OK 74074

American Farm Bureau Federation
Information Division
225 Touhy Avenue
Park Ridge, IL 60068

Dear Sir or Madame:

Thank you for your prompt response to my request for your booklet, "Farm Facts." I received it this morning and was immediately impressed with the wonderful illustrations! I plan to use this information in my Agricultural Education class and am sure it will help me get good grades.

Sincerely,

John Doe

ACTIVITY SHEET

Development of:
READING SKILLS
CREATIVE THINKING SKILLS
PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading and creative thinking and problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Recognizing propaganda
  - Reacting to written material
  - Using magazines and newspapers

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  - Collecting/recording information
  - Identifying critical elements/issues
  - Drawing conclusions

- If students have difficulty recognizing propaganda:
  - Discuss how facts and statistics can be used to present one side of an issue.
  - Discuss how loaded words can be a signal and can influence people's attitudes.

    EXAMPLES: "Your best choice in feed." This is someone's personal evaluation or opinion, not an actual, empirical (observable, provable) evaluation.

- Stress that they be aware of the emotional content of the advertisement

  EXAMPLE: The herbicide commercial that implies that your children and grandchildren will be healthier and happier if you use this product -- appeals to a person's desire for healthy, happy children, but these *feelings* are not related to the functioning of an herbicide

- If students have difficulty reacting to written material:

  - Encourage them to read carefully, evaluate what is actually said against what is implied, and to identify what is being said.

  - Remind them that they are part of the audience that the advertiser is trying to persuade and that their opinion is just as valid as anyone else's.

- If students have difficulty using magazines and newspapers, provide some examples of the kinds of ads they should be looking for.

- If students have difficulty collecting/recording information:

  - Suggest a realistic minimum and maximum number of ads they must collect.

  - Suggest that they look for persuasive messages in a field that is familiar to them, such as clothing or car ads, before they focus on agriculture.

- If students have difficulty identifying critical elements/issues, review the information noting the key words and issues.

- If students have difficulty drawing conclusions suggest that they examine the collected data and look for patterns, the range of ideas expressed, the language used, the pictures or illustrations that accompany the information, and what they are trying to get the reader to believe.

COLLECT ADVERTISEMENTS AND BUMPER STICKERS

Some experts claim that nothing has affected modern American society more than advertising. It helps us shape our goals, values, daydreams, and self-concepts.

How does advertising affect agriculture? Find advertisements and bumper stickers that use agriculture or agriculture-related images or facts. List what they say about agriculture and how it affects what people think about agriculture. Place samples on a bulletin board, and compare them to other advertisements.

Reading Comprehension Skills

- Recognize propaganda
- React to written material

Research and Reference Skills

- Use magazines and newspapers

Cognitive Activities Skills

- Collect/record information
- Identify critical elements/issues
- Draw conclusions

ASSIGNMENT SHEET

Development of:
READING SKILLS
WRITING SKILLS

- Introduce the assignment to the students by discussing why reading and writing skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  WRITING SKILLS

  - Using standard grammar, spelling, and capitalization
  - Stating ideas clearly
  - Using complete sentences
  - Proofreading & editing
  - Writing letters

- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty using standard grammar, spelling, and capitalization:
  - Recommend a basic grammar book and provide a dictionary.
  - Encourage them to have someone check and go over their work with them before they turn it in.

- If students have difficulty stating ideas clearly:
  - Suggest they have their thoughts organized before they begin writing.
  - Have them review the information, noting the key words and ideas.
  - Discuss the importance of stating the ideas clearly.
  - Instruct them to use simple, concise words.
- If students have difficulty using complete sentences, remind them to check for a subject and a verb (and be sure that it is singular or plural to agree with the subject), and a predicate, if it is needed to complete the idea.
- If students have difficulty proofreading and editing:
  - Direct them to read slowly and carefully for meaning, punctuation, spelling, and capitalization.
  - Instruct them to take out any unneeded sentences, phrases, words, or punctuation.
  - Have them read the letter backwards to look for misspelled words.
- If students have difficulty writing letters:
  - Remind them that letters are an important means of communication.
  - Examine the structure using the samples in the unit and samples from junk mail letters.
  - Remind them to keep the letter simple and to the point.

OBJECTIVE 9 **Write a letter of request and a thank-you letter.**

INTRODUCTION

In 1883, Edward George Bulwer-Lytton wrote:

> *Beneath the rule of men entirely great*
> *The pen is mightier than the sword.*

You've heard that before, but you may not be aware of how true it still is today. A simple, well-written letter can get you information, samples, or many other things.

You will need:

- The address of a company, government office, or organization
- Writing paper and envelopes
- Two stamps
- A computer, typewriter, or ink pen (blue or black ink only)

DIRECTIONS

1. Decide what you are going to ask for. Make a short list of what you want and why.
2. Write the return address and heading of the letter. The return address has the date, your address, city and zip code. Skip one line and put the address where you are sending the letter. Skip one more line and write "Dear Sir or Madame."
3. Write the body of the letter. State clearly and quickly what you want, where it should be sent, and where they can contact you, if necessary. If there is any charge, state the amount of money you are sending and how it is being sent (check, money order, etc.). Say that you have included a self-addressed, stamped envelope (you can just write SASE).
4. Skip two lines and write a closing (Sincerely,) and sign the letter. If you are typing the letter or writing it on a computer, leave three blank lines and then type your name. Sign the letter between the closing and where your name is typed.
5. Put your address in the upper-left hand corner of two envelopes.

Functional Reading Skills
- Follow written instructions

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Composition Skills
- Use complete sentences
- Proofread & edit

Functional Writing Skills
- Write letters

6. Address the first envelope to yourself and put a stamp on it.

7. Address the second envelope to the person you are writing and put a stamp on it.

8. Fold the letter and the envelope addressed to you neatly. Seal them in the second envelope.

9. Mail the letter.

10. Mark your calendar with the date you mailed the letter. Mark the date four weeks from when you mailed your letter. If you have not received a response by that time, send a second letter.

11. After you receive an answer, write a thank-you letter. Begin by writing the heading and return address.

12. Write the greeting (Dear Sir or Madame:).

13. Write a short paragraph that thanks the sender and mentions how the item or information will be used.

14. Write a closing and sign the letter, just as you did in step 4.

15. Address the letter; write your address in the upper, left-hand corner; stamp the envelope; and mail it.

JOB SHEET

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS

- Introduce the assignment to the students by discussing why reading, writing, and oral communication skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING

  - Gaining factual information
  - Selecting useful resources
  - Locating resources
  - Finding materials in library
  - Following written instructions

  WRITING

  - Taking notes
  - Using note cards

  ORAL COMMUNICATION

  - Making informative presentations
  - Using good speaking techniques
  - Selecting/using words effectively
  - Using effective body language
  - Presenting appropriate appearance

- If students have difficulty gaining factual information, remind them to read carefully, noting key words and ideas.

- If students have difficulty selecting and locating useful resources:
  - Suggest sources in your field.
  - Direct them to ask the librarian to help them use the *Reader's Guide to Periodic Literature* and other references listed.
  - Show them how to use references found in footnotes and bibliographies.
- If students have difficulty finding materials in the library:
  - Encourage students to ask a librarian for help.
  - Invite a librarian to explain the Dewey decimal system.
  - Arrange a tour of the school or public library.
- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty taking notes, review basic note-taking techniques, including name of source, date of publication and publisher.
- If students have difficulty using note cards encourage them to keep cards in an order that makes sense to them.

  EXAMPLE: Alphabetical; chronological; by different subject areas in their topics; by speech sections: Introduction, 1st major point, 2nd major point, conclusion
- If students have difficulty making informative presentations:
  - Remind them that being prepared is the best way to handle nerves and insure a successful presentation. Encourage them to practice in front of a mirror, for their families and close friends before they make the speech in class.
  - Explain that being nervous is a natural part of making a speech. The fear will go away within 30 seconds after they start.

  - Suggest that the student who gets a dry mouth bring a glass of water to the stand.
  - Stress that the people in the audience are not critics, waiting for the speaker to make a mistake. Audiences WANT the speaker to succeed; they want the information and entertainment in a presentation.

- If students have difficulty using good speaking techniques, selecting/using words effectively, and using effective body language:

  - Suggest that they watch good speakers on television or in local assemblies or other programs.
  - Stress that students should use a natural, conversational approach.
  - Explain that being heard and maintaining good eye contact are the most important factors in a good delivery. Remind students that they are *talking to people*, and not reading note cards.
  - Discuss the importance of expressing ideas clearly, in a well-organized way, with a clear beginning, middle and end.
  - Encourage students to use good language and more specific language than in their everyday speech.
  - Stress that good preparation and practice are the most important factors in sounding and looking good.

- If students have difficulty presenting appropriate appearance, explain that they are asking others to look at them (their whole bodies) and to form an impression about what they say. Dressing appropriately is part of making that impression a good one.

OBJECTIVE 10

Present a speech giving your opinion.

EQUIPMENT AND SUPPLIES

- Note cards
- Resources and references

INTRODUCTION

Public speaking is an important skill for many agriculture-related jobs. Greenhouse managers explain policies and plans to the staff. County extension agents give instructions to many people and address local organizations. Landscape architects present proposals to landowners. Teachers address classes every day. Even farmers may be asked to show their operation to different groups.

If you don't go into agriculture, public speaking is still an important skill. Business people, doctors, athletes, and other professionals use these skills to further their careers and improve their image. The ability to speak well in front of a group can help you get a promotion, can lead to exciting hobbies such as community theater or can even help get you elected to public office. It will also be an important skill when you are competing for scholarship money or summer jobs.

The secret to presenting a good oral report is good planning. It is important that you know your subject matter and can answer questions. It is even more important that you organize your information. If you are in control of the situation, you will do well.

PROCEDURE

1. Select a topic.

   Choosing a topic is the most important part of preparing for an oral report. Your topic should be specific. For example, "Reading Smoke Signals," "Trailmarking," "Mimes–the Silent Clowns," or "Reading Body Language" would all be better than the broad topic "Using Nonverbal Communication." Choosing an unusual perspective will make your speech even more interesting. For example, "Reading Smoke Signals" or "Trailmarking" would include information most people don't already know. But be careful not to choose a topic so narrow or unusual that finding information is difficult.

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Select useful resources
- Locate resources
- Find materials in library

Functional Reading Skills
- Follow written instructions

Research Skills
- Take notes
- Use note cards

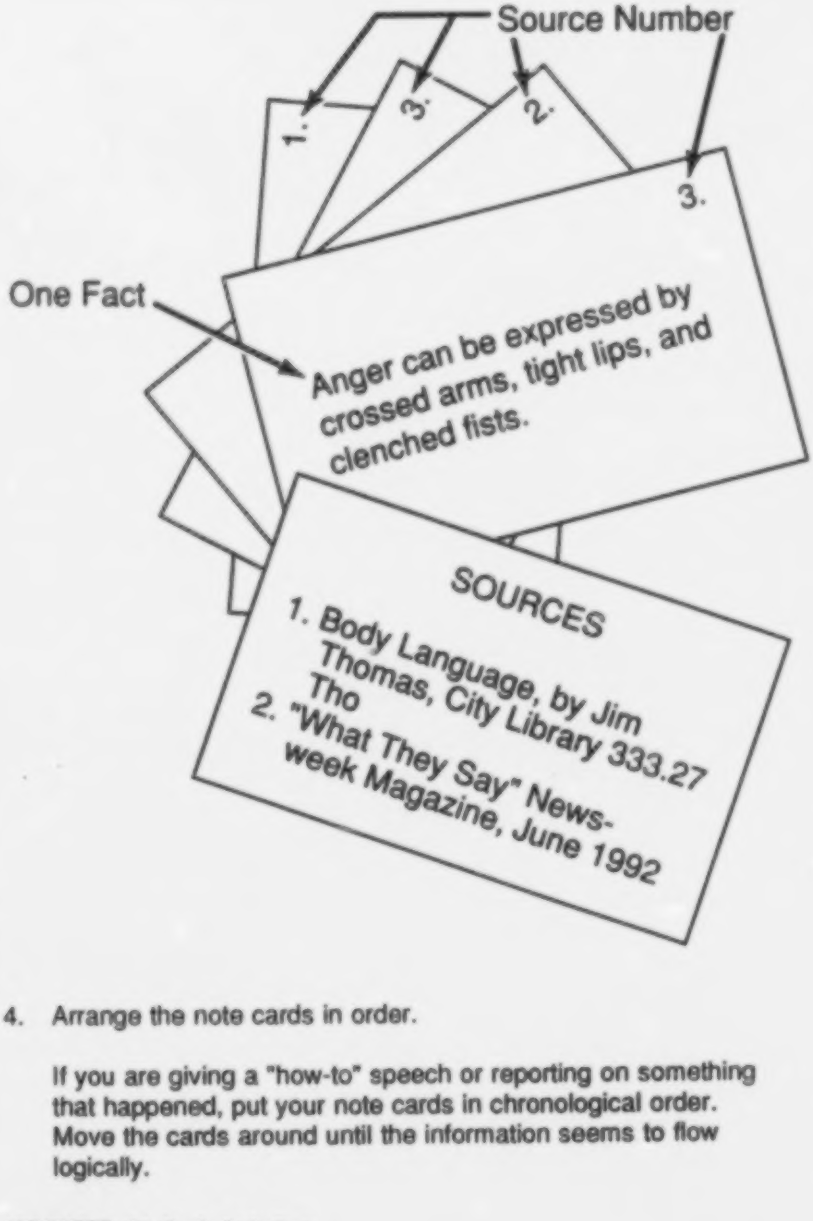
Oral Presentation Skills
- Make informative presentations
- Use good speaking techniques
- Select/use words effectively
- Use effective body language
- Present appropriate appearance

2. Research the topic.

   Visit your local or school library, contact your county extension agent, or use any other source you can think of.

3. Take notes.

   Write each fact on a separate note card. Keep a separate list of sources. Number your sources. Each time you write down a fact, write the source's number in the upper right-hand corner.


Source Number
1.
3.
2.
3.
One Fact
Anger can be expressed by crossed arms, tight lips, and clenched fists.
SOURCES
1. Body Language, by Jim Thomas, City Library 333.27
Tho
2. "What They Say" Newsweek Magazine, June 1992

4. Arrange the note cards in order.

   If you are giving a "how-to" speech or reporting on something that happened, put your note cards in chronological order. Move the cards around until the information seems to flow logically.

5. Write an introduction.

   Your opening statement should get the audience's attention and tell them what you are going to talk about. For example, if you are going to discuss "Mimes–the Silent Clowns," you might begin with "What entertainers never learn their lines?"

6. Write the body of the speech.

   The body of your speech should contain your main points. Most speakers try to include more than one main point. Including only one main point gives your audience only one reason to believe what you are saying. Each main point should be supported by facts and/or statistics.

> Remember the old speechmaker's motto: Tell them what you're going to tell them, tell them, then tell them what you told them. That means, let the audience know what you want them to learn from your speech at the very beginning. Then explain your topic and use examples, stories, statistics, or visual aids to help them understand it. Finally, summarize your points again for your conclusion.

7. Write your conclusion.

   Your conclusion should make your point in one, easy to understand sentence. For example,"Even without using words, mimes express ideas and emotions, and help us laugh at ourselves."

8. Practice making the speech.

   a. Set your stopwatch or alarm clock to the time limit your instructor sets. Make sure your speech is the right length.

   b. Do not write out your whole speech. It will sound stiff. Instead, memorize your introduction and conclusion, look at the facts on your note cards and put everything in your own words. As you practice, you will begin to use the same phrases naturally. You'll remember them more easily, too, because they're in your own words. Soon, you'll notice that you don't need some of the note cards. Remove them from your stack or replace them with a note card containing just a few words to prompt you.

NOTES TO USE FOR SPEECH ON MIMES

- Clowns
- Street artists
- Physical strength
- Training
- Language barriers
- Age barriers
- Famous mimes

c. Stand while you practice. Do not move as you talk, except to use your hands to clarify or illustrate points. If you keep your feet shoulder's length apart, you will be able to shift your weight without it showing.

d. Practice moving your head as you talk. When you give your speech you will want to look around the audience, making eye contact with different people in the audience.

e. Do not say "uh" or "oh." If you aren't sure what to say, be quiet.

9. Dress appropriately.

On the day of the speech, make sure your clothes are clean, your hair is neat and combed, your shoes are tied, and your note cards are in order.

A word to the wise: Don't use alarms on your watch to tell you when your time is up. You may lose the attention of your audience if you have to stop, turn off your watch, and then quickly sum up your speech. Also, remember that if it hasn't gone off, you'll be trying to stretch your speech until it does. And once it goes off, you (and everyone in the audience) will know you've been talking too long.

10. Don't be afraid of being nervous.

Most people are a little scared of public speaking–until they do it. It's not as bad as it looks and everyone else in the class is going through the same thing. The nervousness will go away after you start speaking. If you know your speech, you'll be all right. When it is your turn to speak, take a moment before you stand up. Look at your note cards, breathe deeply, then go for it.

PRACTICAL TEST

AGRICULTURAL COMMUNICATION

III

JOB SHEET

Present a speech giving your opinion.

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Selected an appropriate topic	___	___
2. Researched the topic	___	___
3. Kept organized notes	___	___
4. Arranged note cards in order	___	___
5. Wrote an introduction	___	___
6. Wrote the main body	___	___
7. Wrote a conclusion	___	___
8. Practiced making the speech	___	___
9. Dressed appropriately	___	___
10. Displayed poise	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Researched topic thoroughly	4	3	2	1
Organized work	4	3	2	1
Presented topic effectively	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

AGRICULTURAL COMMUNICATION

III

Name ____________________ Score __________

OBJECTIVE 1

Match terms associated with agricultural communication to their definitions. Write the correct letter in each blank.

_____ 1. Communication using words

_____ 2. Instruments for communicating with the general public

_____ 3. The effect of the environment on communication

_____ 4. Communication without using words

_____ 5. The exchange of information, ideas, or opinions

_____ 6. The response to a message

_____ 7. The values, beliefs, prejudices, and feelings that affect the messages we send and receive

_____ 8. What has actually happened or is actually true

_____ 9. What one believes has happened or is true

a. answers
b. communication
c. fact
d. feedback
e. feelings
f. filter
g. media
h. noise
i. nonverbal
j. opinion
k. perspective
l. talking
m. verbal

May be photocopied for student use.

OBJECTIVE 2 **Distinguish between verbal and nonverbal communication.** Write a "V" the blanks before examples of verbal communication and an "N" in the blanks before examples of nonverbal communication.

_____ 1. Humming

_____ 2. Cheering the football team

_____ 3. Talking

_____ 4. Grunting or groaning

_____ 5. Singing words of a song

_____ 6. Gestures and facial expressions

_____ 7. Instrumental music

_____ 8. Sketches and drawings

_____ 9. Reading aloud

_____ 10. Yelling "stop"

OBJECTIVE 3 **Discuss why good communication skills are important.** Write your answer in the space below.

____

____

____

____

____

____

____

____

____

____

May be photocopied for student use.

OBJECTIVE 4 **Select from a list types of media.** Write an "X" in the blank before each type of media.

_____ 1. Yard signs

_____ 2. Maps

_____ 3. Newspapers

_____ 4. Birthday cards

_____ 5. Computer bulletin boards and networks

_____ 6. Magazines

_____ 7. Books

_____ 8. Billboards

_____ 9. Report cards

_____ 10. Radio

_____ 11. Postage stamps

_____ 12. Television

OBJECTIVE 5 **Choose the word or phrase that completes statements about modern communication technology.** Write the correct letter in the blank.

_____ 1. When the printing press was invented,

a. no real changes occurred for several hundred years
b. the printed word became available to the general public, and society began to rely on it
c. the printed word was already heavily relied on
d. governments required that everyone learn to read

_____ 2. As technology progressed

a. convenience and speed became more important
b. power sources had to change
c. nonverbal communication became more important
d. agriculture failed to use new communication technologies

May be photocopied for student use.

_____ 3. Computer technology has brought us cellular telephones, FAX machines, and

a. copiers
b. telegraphs
c. pagers
d. radars

_____ 4. Computers can send information from place to place or allow hundreds of employees to share the same files. This is called

a. programming
b. networking
c. word processing
d. data basing

_____ 5. By the turn of the century, many experts believe our television, radio, printed media, telephone, and computer systems will all

a. be useless
b. use magnetic disks
c. be included in one unit
d. use solar energy

_____ 6. Another change that will continue to revolutionize communication is

a. miniaturization
b. expansionism
c. reductionism
d. digitation

_____ 7. One system proposed by Motorola, would feature 77 satellites in continuous orbit. The satellites would be positioned so that instant access to any point on Earth would be possible. This would allow calls and communications to

a. be much faster and clearer
b. be sent and received by computers
c. be much less expensive
d. follow each person

May be photocopied for student use.

_____ 8. One challenge technology hasn't solved is

- a. quick communication from space
- b. inexpensive overseas communication
- c. sending copies of documents from place to place quickly
- d. undersea communication

_____ 9. Fiber optics send

- a. magnetic pulses
- b. sound waves
- c. light pulses
- d. energy bursts

_____ 10. One agriculture-based network is the

- a. Data Transmission Network
- b. Farm Network
- c. Farm Data Transmission Network
- d. Ag-Data

OBJECTIVE 6

Select from a list true statements about the effects of international communications on agriculture. Write an "X" in the blank before each true statement.

_____ 1. Today's world has been called a "global community."

_____ 2. Transportation and communication technology make talking with and visiting other places much easier.

_____ 3. If another country begins producing large amounts of wheat, American farmers will benefit from rapidly rising prices of wheat.

_____ 4. It is easier to do business with people in other parts of the world than it used to be.

_____ 5. While it is easy to talk to people in other parts of the world, transporting products overseas is still too expensive to be used for agriculture.

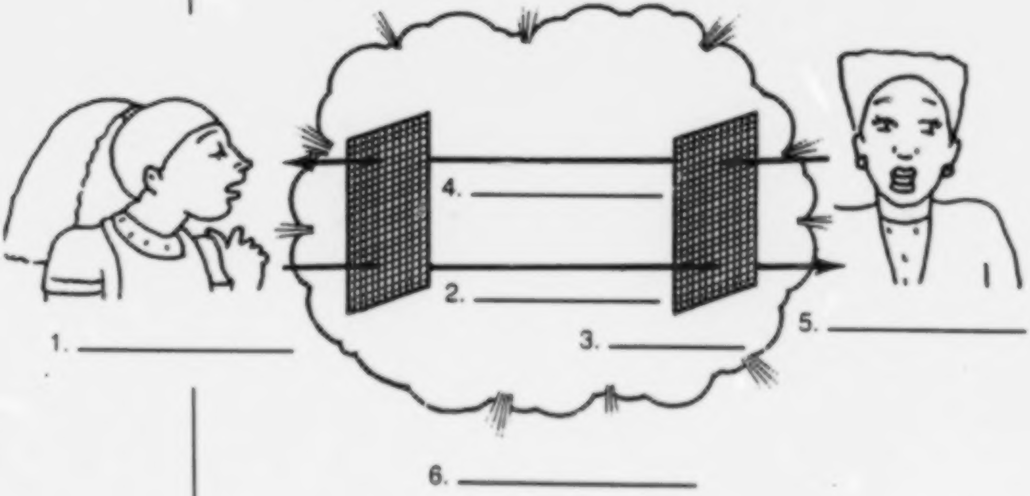
_____ 6. Specially trained agribusiness professionals pay attention to what is happening overseas, but individual farmers do not.

_____ 7. If another country begins producing large amounts of wheat, American farmers will lose some international sales and the price of wheat will fall.

May be photocopied for student use.

____ 8. Farmers and ranchers use agricultural publications and computer networking to follow trends in foreign production, policies, and prices.

OBJECTIVE 7 **Label elements in communication organization structures.** Write the words in the blanks.



OBJECTIVE 8 **Distinguish between facts and opinions.** Write an "F" in the blank before each fact and an "O" in the blank before each opinion.

____ 1. His bull got first place.

____ 2. This tastes great!

____ 3. The weatherman said it would rain today.

____ 4. Things don't look very good, actually.

____ 5. The government should do something about this.

____ 6. This book is overdue.

____ 7. He said to take a soil sample here.

____ 8. You shouldn't do that.

____ 9. The buzzer went off.

____ 10. Hey, that looks cool.

May be photocopied for student use.

NOTE: Objectives 9 and 10 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS
AGRICULTURAL COMMUNICATION
III

OBJECTIVE 1

1. m
2. g
3. h
4. i
5. b
6. d
7. f
8. c
9. j

OBJECTIVE 2

1. N
2. V
3. V
4. N
5. V
6. N
7. N
8. N
9. V
10. V

OBJECTIVE 3

Answers should include the following:

- Communication is the way we express how we feel, how we learn, how we work with other people.
- Important in finding and keeping a job; filling out an application, interviewing, and operating a computer.
- Being able to communicate with family and friends.
- Being able to listen to what candidates, officials, and experts say and determine what their beliefs and views are.
- Being able to separate facts from opinions and come to your own conclusions.
- Help you keep and understand records, ask questions, and understand the answers you receive.

OBJECTIVE 4

1, 3, 5, 6, 7, 8, 10, 12

OBJECTIVE 5

1.	b	6.	a
2.	a	7.	d
3.	c	8.	d
4.	b	9.	c
5.	c	10.	a

OBJECTIVE 6

1, 2, 4, 7, 8

OBJECTIVE 7

1. Sender
2. Message
3. Filter
4. Feedback
5. Receiver
6. Noise

OBJECTIVE 8

1.	F	6.	F
2.	O	7.	F
3.	F	8.	O
4.	O	9.	F
5.	O	10.	O

OBJECTIVE SHEET *PLANTS AND SOILS* IV

INTRODUCTION

Few things have been as important to man as soil. American Indians and ancient Europeans called it "Mother Earth" and revered it as a god. The Japanese grew and cared for beautiful gardens as part of their Shinto religion. American pioneers traveled westward, drawn by the promise of rich soil. The exchange of crops and farm products brought nations together and fueled the colonization of the New World, Africa, and Australia. Wars have been fought for inches of soil and postponed to harvest the fruits of the land. Not a day goes by that you don't wear, eat, breathe, and use the products of plants and soils.

Even though technology has advanced, nothing has replaced the need for soil and plants. Rather, their importance continues to grow. We look to plants as a source of new medicines. We know that, through plants and soils, our atmosphere can be cleaned, water supply protected, and land conserved. New sciences look into the riches of soils and plants, how they work, and how we can best protect them.

UNIT OBJECTIVE

After completing this unit the student will know soil types and characteristics, how plants work, and new plant technologies. The student will demonstrate these competencies by completing job sheets, practical tests, and a written test with a minimum of 85% accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with plants and soils to their definitions.
2. List ways rocks are broken down to form soil.
3. Label types of soil.
4. Select from a list true statements about how plants work.
5. Choose the word or phrase that completes statements about the importance of water and nutrients.
6. Choose the word or phrase that completes statements about plant breeding and genetics.
7. Match new plant technologies to their descriptions.

8. Take a soil sample. (Job Sheet 1)

9. Make a soil cluster display. (Job Sheet 2)

10. Measure the amount of water absorption in soils. (Job Sheet 3)

11. Grow plants in various soils. (Job Sheet 4)

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Review Units 7, "Field Crops" and 5, "Horticulture" for similarities.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Possible speakers include local farmers, county extension agents, and geologists. Supply speakers with specific objectives and other appropriate sections of the unit.

- Make arrangements for soil-related activities to be conducted in your schoolyard.

- Make arrangements for any audiovisual equipment needed for this unit.

- Arrange to have all materials and supplies necessary to complete job sheets.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with plants and soils to their definitions.

- Introduce the topic by having students list phrases that relate to plants and soils. They can range from "plant your feet" to "dry as dust." Have students discuss what ideas people have about plants and soils.

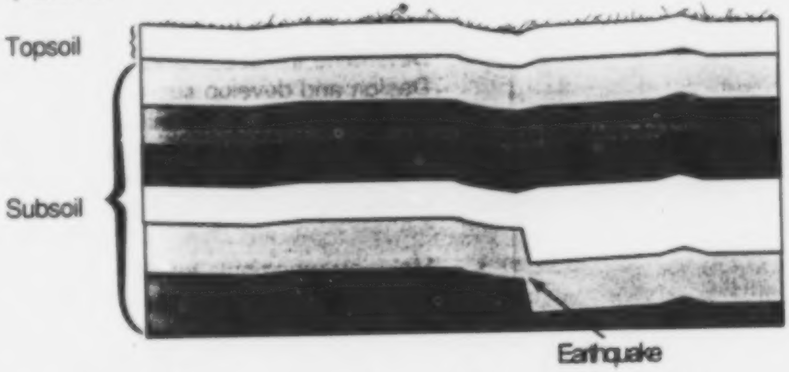
- Add to the list terms introduced by guest speakers.

Objective 2: List ways rocks are broken down to form soil.

- Let students make soil by rubbing stones together, heating a piece of limestone then dropping it in ice water, or heating a container of limestone and vinegar (will take several days).

- Have students look at areas where construction is under progress or where trenches have recently been dug. Have them identify topsoil and subsoil and have them measure topsoil depth.

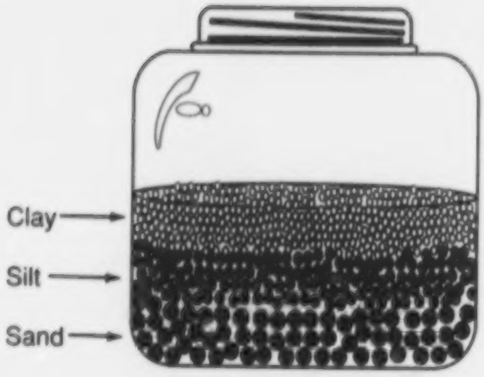
- Tell students that geologists now study topsoil and subsoil layers to help them predict earthquakes. By locating sudden changes in the "line" dividing topsoil and subsoil, they can pinpoint when earthquakes occurred and the effect on the land. This accurate, natural record may help them find earthquake patterns.



- If your area is near natural springs, glacier remains, or other geologic examples of weathering, take the students to the areas and have them take soil samples there.

Objective 3: Label types of soil.

- Have students take soil samples from several locations and make sure the samples contain a variety of particle sizes. Have them fill a glass jar with a mixture of two parts water and one part soil. Add two teaspoons of dishwashing detergent. Shake the soil and water mixture and allow it to settle. After the soil layers have formed, a piece of masking tape can be used to label the different layers.



NOTE: Sand and gravel will settle in a few minutes, silt in about four hours; clay and clear water in two days.

- Have students discuss why the larger (heavier) particles are at the bottom of the sample.

- Explain to students that the size of soil particles determines the amount of space between particles, and therefore, the amount of space available for water retention.

- Compare loam to soil types.

- Invite an agronomist or extension agent to discuss the soil in your area and how it affects crop production.

- If soil in your area is sandy or clay-filled, have students mix local samples with organic matter and other compounds until a good loam is produced.

- Have students complete Job Sheets 1 and 2.

Objective 4: Select from a list true statements about how plants work.

Objective 5: Choose the word or phrase that completes statements about the importance of water and nutrients.

- Use Extensions & Options 1 to discuss nutrients.

- Have students collect examples of plants at various stages of development.

- National testing in 1990 showed that most high school seniors believe that plants get all food through the roots. Discuss what roots absorb and how it is changed by photosynthesis.

- Discuss how plants absorb carbon dioxide and give off oxygen. This will be covered in more detail in later units "Forestry" and "Agricultural Ecology and the Environment."

- Have students complete Job Sheets 3 and 4.

- Use the Student Supplement to introduce the subject of soil chemistry and its importance to plant growth and plant selection.

- Discuss the importance of water and soil conservation. These will be discussed more fully in "Agricultural Ecology and the Environment."

- Have students conduct tissue testing. These tests indicate nutrient deficiencies. One recommended kit is the NPK Kit, available from Soil Chem, Box 54, Rossville, IL 60963, 217-748-6794. Each kit contains supplies and instructions to test 50-100 samples for each major nutrient.

Objective 6: Choose the word or phrase that completes statements about plant breeding and genetics.

- Explain to students that the science of genetics, now an important field in human medicine, began with the study of plants. Mendel's pea plants and predictions of pea color, pod shape, pea texture, and flower color, are still the foundation of the science.

- Have students suggest the most useful, most bizarre, most marketable, and most entertaining plants that could be produced through genetic planning. If the students have trouble imagining changes, remind them of "Audry" in *Little Shop of Horrors* or *The Tomato that Ate Philadelphia.*

Objective 7: Match new plant technologies to their descriptions.

- Have your students contact the crew of Biosphere II by writing Biosphere II, PO Box 689, Oracle, Arizona, 85623. A free monthly newsletter of agricultural and cultural progress within the Biosphere is available by writing to that address.

- Have students construct a hydroponics system. One possible system is described in Extensions & Options 2.

- Have students describe the farm of the future. Have them make models or suggest how crops will be grown. Have them suggest how a colony on Mars might be fed.

APPLICATION

Objective 8: Take a soil sample.

- Invite a county extension agent, fertilizer salesperson, or other agency representative to discuss soil testing.
- Have students compare the appearance of soil samples taken from different types of soil.
- Allow students to work in teams to speed sample collection.
- Have students keep soil samples and compare appearances and testing results.

Objective 9: Make a soil cluster display.

- Compare soil clusters to soil samples taken for Job Sheet 1.
- Have students notice which clusters dry fastest and explain why.
- Allow students to work as teams, each team completing a single display and preparing a single list of conclusions or prepare the mudballs yourself while the class watches and allow each student to list conclusions individually.

Objective 10: Measure the amount of water absorption in soils.

- Have students work in teams, perhaps assigning one team from each class to chart each container's progress.
- Have students watch the soil outside the can for capillary drainage.
- Have students check each location after the cans are removed and time how long it takes each spot to dry.
- Have students compare covered and exposed soils. Discuss how mulch or other covers prevent soil erosion and improves the soil quality.
- Have students compare the amount of soil splashed up on the sides of the cans. Have students suggest why this is important.

Objective 11 Grow plants in various soils.

- This exercise will take some time. You might want to continue it through Units 5 and 6, then discuss the conclusions during Unit 7, "Field Crops."
- Assign plant care to each student for certain days.

- Review Unit 2, Record Keeping.
- Have students complete the scientific process by formulating testing techniques, completing testing, compiling results, and drawing conclusions. Discuss this process and its importance.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.
- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *And One to Grow On.* The Fertilizer Institute, 501 Second Street NE, Washington, DC 20002. Describes the role of fertilizers in agriculture, modern fertilizer production, and use. (18 minutes, 16 mm film)

- *Food: Will There Be Enough?* Prentice-Hall Media, Inc., PO Box 3000, Mt. Kisco, NY 10549. Discusses future demands on farmers who will be forced to feed more people while using less land. (2-part filmstrip with guide)

- *The Giant Mobile.* The Fertilizer Institute, 501 Second Street NE, Washington, DC 20002. Shows the importance of the farmer's use of fertilizers. (13 minutes, 16 mm film)

- *I Am Wheat.* Kansas Wheat Commission, 2630 Claflin Road, Manhattan, KS 66502-2743. Discusses wheat's production and uses. (12 minutes, 16 mm film or VHS)

- *Kernels and Kobs.* Yamhill County Women for Agriculture, PO Box 101, Dayton, OH 97114. Discusses sweet corn production and sales. (15 minutes, slide presentation on tape)

Print Media

- *Ag Aviation—Ag Pilot...A Career You Can Grow In.* The Women of the National Agricultural Aviation Association, Tri-State Aviation, Inc., P.O. Box 843, Wahpeton, ND 58074. Brochure. Describes the educational requirements, earnings, and responsibilities of ag pilots.

- *Agricultural Aviation: Critical Assist for the World's Food Supply (Secondary Level Educational Curriculum Guide).* The Women of the National Agricultural Aviation Association, Tri-State Aviation, Inc., P. O. Box 843, Wahpeton, ND 58074. Includes information on the agricultural aviation industry, a glossary, resource listing, career outline, and information about agri-chemicals. The information is integrated into social studies, language arts, mathematics, and the sciences.

- Arnow, Jan. *Hay from Seed to Feed.* Photo essay. Describes the production and harvest of alfalfa for livestock feed. Available from your local library or bookstore ISBN# 0385145381.

- *Corn Touching Our Lives Every Day.* Illinois Corn Marketing Board, 2415 E. Washington St., Bloomington, IL 61704. Six panel brochure. Illustrates uses for corn and how it affects our lives.

- *Ethanol and its Use as a Motor Vehicle Fuel.* Illinois Corn Marketing Board, 2415 East Washington, Bloomington, IL 61704. 12-page booklet. Discusses the use of ethanol as an alternative fuel, its production and history, and suggested student and classroom activities.

- *Farm Facts.* American Farm Bureau Federation, Information Division, 225 Touhy Avenue, Park Ridge, IL 60068. 28-page booklet. Includes statistical information and clear charts on American agriculture and commodities, a glossary, and a brief history of agricultural highlights.

- *Farmers Care!* American Farm Bureau Federation, 225 Touhy Avenue, Park Ridge, IL 60068. 3-panel brochure. Illustrates the changes in family farming.

- Horowitz, Elinor Lander. *On the Land: American Agriculture from Past to Present.* A book describing the history of American Agriculture and changes on the farm. Available from your local library or bookstore ISBN# 068959165X.

- Rahn, Joan Elma. *Plants that Changed History.* A book describing five plants that changed history. Available from your local library or bookstore ISBN# 0689309406.

- Selsam, Millicent E. *Cotton.* 48-page booklet. Describes the history of cotton, stages of growth and processing, and where cotton is grown. Available through your local bookstore or library.

- Shuttlesworth, Dorothy E. and Gregory J. Shuttlesworth. *Farms for Today and Tomorrow: The Wonders of Food Production.* A book describing the development of modern farming techniques and demands on future farm production.

- *Still Farming with Residue.* North Dakota State Soil Conservation Committee, State Highway Building, Capitol Grounds, Bismarck, ND 58505. 8-page booklet. Discusses conservation tillage and residue management.

- The Oklahoma State University Cooperative Extension Service and Agricultural Experiment Station offer a wide variety of publications related to this topic. For a complete listing, contact your local county extension agent or Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550.

UNIT REFERENCES

- Bruneau, L. Herb. Genetics Professor, Oklahoma State University. Interview, July 29, 1991.
- Carpentier, Dale R. "Hydroponics On A Budget." *The Agricultural Education Magazine.* January, 1991.
- Golob, Richard and Eric Brus. *The Almanac of Science and Technology, What's New and What's Known.* Harcourt Brace Jovanovich: Boston, 1990.
- Hanlon, Ed and Gordon Johnson. *OSU Agronomic Services' Procedure for Soil, Forage and Water Testing.* Cooperative Extension Service, Oklahoma State University.
- Johnson, Gordon. *How to Get a Good Soil Sample.* Cooperative Extension Service, Oklahoma State University.
- Maxson, Joe M. *Plant Science, Horticulture, Field Crops, 4-H Member Guide.* Cooperative Extension Service, Oklahoma State University: Stillwater, OK.
- Osborne, Ed. "Teaching Tips: Plant Tissue Testing." *The Agricultural Education Magazine.* January, 1991.
- United States Department of Agriculture. *Teaching Soil and Water Conservation, A Classroom and Field Guide.* Washington, DC, 1986.

SYMPTOMS OF NUTRIENT DEFICIENCY

Nutrient	Characteristic	Deficiency Symptom
Primary		
Nitrogen (N)	All converts to nitrate. Nitrate can leach from soil. Ammonium held to soil. Plants use mostly nitrate, some ammonium.	1. Slow growth, stunted plants 2. Yellow-green color 3. Firing of **older leaf** tips
Phosphorous (P)	Easily tied up by soil and made unavailable to plants. Availability reduced at high or low pH and soil temperature below 50°F. Form for plant use varies with soil pH.	1. Slow, stunted growth 2. Purplish color to leaves/stems 3. Delayed maturity 4. Dark green, dead leaf tips 5. Poor fruit/seed development
Potassium (K)	Increases size and quality of fruit. Adequate quantities available in most western Oklahoma soils.	1. Tip and marginal burn on **older leaves** 2. Weak stems, lodging 3. Small fruit, Shriveled seeds 4. Slow growth
Secondary		
Calcium (Ca)	Major component of cell wall. Does not move within plant. Deficiency related to blossom end rot of tomato and others. Can be deficient in acid soils, but corrected by liming.	1. Death to **growing points** of top and root 2. Unusually dark green foliage which fails to unfurl 3. Premature blossom/bud shed 4. Weak stems
Magnesium (Mg)	Deficiency may show on sandy acid soils. Can be corrected with dolomitic limestone during pH adjustment.	1. Yellowing between **older leaf** veins 2. Leaves curl up along margins 3. Marginal yellowing with "Christmas tree" shape along midrib
Sulfur (S)	Can be deficient in acid soils	1. Pale green/yellow color to **young leaves** initially 2. Small weak plants 3. Retarded growth, slow maturity 4. Yellow between veins of corn leaves
Micronutrients (trace elements)		
Zinc (Zn)	Terminal growth areas affected first. Deficiency can be caused by excess phosphorous	1. Decreased stem length, rosetteing **terminals** 2. Reduced fruit bud formation 3. Mottled leaves 4. Stripping or banding of corn leaves
Iron (Fe)	Deficiency can be induced by high manganese at low pH. Usually as sociated with high pH soil or excess liming.	1. Yellowing between dark green veins of **young leaves**
Manganese (Mn)	Excess may induce iron deficiency at low pH.	1. Yellowing between veins of **young leaves.** Not as distinct as with iron
Copper (Cu)	Not usually deficient. May be linked to fruit cracking in tomato	1. Stunted growth 2. Poor color 3. Wilting and death of leaf tips
Boron (B)	Does not move within plant. Deficient occasionally on cole crops.	1. Soft, dead spots on fruit or tubers 2. Reduced flowering and pollination 3. Thick, curled, wilted, yellow leaves
Molybdenum (Mo)	Essential for N fixation by legumes. May be applied with seed inoculation. Deficiency often corrected with liming.	1. Stunted, unvigorous plants 2. "Whiptail" of cauliflower 3. Cupping or rolling of leaves

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HYDROPONICS: EASIER THAN YOU THINK

It may seem like science fiction, but plants are being grown without soil. They are grown in nutrient solutions, hydroponically, in labs, classrooms, and homes throughout the world. Plants grown using this method require regular attention, but growing them is still easy.

What you need:

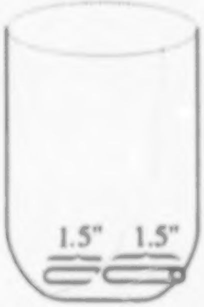
- Two one-gallon cans (use cans made to hold liquids or they will rust)
- A 6" piece of .030" copper refrigerator tubing
- 3' of non-toxic flexible tubing
- Tubing cutter
- Pliers
- Drill
- Soldering iron, solder, and flux
- Hot water, soap, and bleach
- 1/16" gravel (the kind used in aquariums)
- Seedlings or small seeds and florist's foam
- Water-soluble fertilizer
- Hydroponic solution or water-soluble micronutrient fertilizer
- Sieve
- Felt marker

Procedure

1. Cut the copper tubing in half.

2. Drill a hole one inch from the bottom of each can. The hole should be the same size as the copper tubing.

3. Place a piece of the copper tubing in each hole. Center the tubing.



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Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English & metric measures

Functional Math Skills
- Make measurements

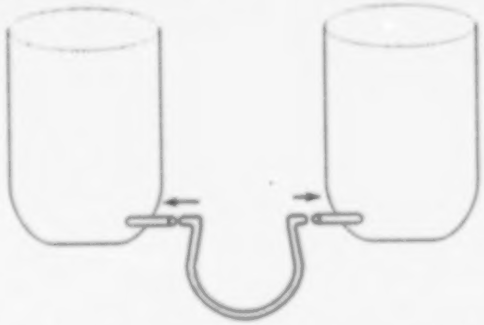
General Science Skills
- Investigate/apply technology

4. Use the solder, flux, and soldering iron to seal the copper tubing and can.

5. Check the copper tubing to be sure it is not plugged with solder.

6. Clean and sterilize the cans. Wash them in soap and water, rinse in hot water and bleach, the rinse again in hot water.

7. Slip ends of the flexible tubing over the copper tubes connecting the two cans.



8. Use the sieve to hold gravel. Wash the gravel in hot water with soap, rinse in hot water with bleach, then in hot water alone.

9. Fill one can with gravel to one inch from the top of the can.

10. Raise the empty can. Pour water into the other can until the gravel is covered.

11. Lower the empty can. Raise the can with gravel until all the water drains to the empty can.

12. Mark the water level with a felt marker.

13. Place seedlings in the can with gravel. If seeds are used instead of seedlings, remove a small amount of gravel and replace it with a piece of florist's foam. Place the seeds on the foam.

14. Add fertilizers and micronutrient to the water, following label instructions.

15. Care for the plants:

    - Water the plants 4 times each day by raising the water-filled can until all water drains into the gravel. Then reverse their positions until the water returns to the empty can.

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- When the water level in the empty can drops below the felt marker line, add more water to the can.

- Replace the water and nutrient solution every 4 to 7 days.

- After the water is changed 3 to 4 times, flush the system with distilled water.

- Remove the plants from light and do not water them at night.

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PLANTS AND SOILS

OBJECTIVE 1

Match terms associated with plants and soils to their definitions.

- **annual** – a plant that completes its life cycle from seed to plant, flower, and new seed in one year or less
- **biennial** – a plant that takes two seasons to complete its life cycle
- **germination** – when a seed "opens" and sends out roots and stems
- **life cycle** – the changes in an organism from the beginning of life to the end of the organism's life
- **loam** – the most desirable type of soil; includes organic matter, soil particles of various sizes, and nutrients
- **perennial** – a plant that lives two or more years but is able to produce seeds the first year
- **photosynthesis** – the process in which plants convert carbon dioxide, sunlight, and chlorophyll into foods they need
- **pollination** – the process in which pollen is moved from male plants or plant parts to female plants or plant parts
- **reproduction** – the process of fertilization and seed growth
- **subsoil** – lower soil level with little or no organic matter
- **topsoil** – upper soil level with organic matter

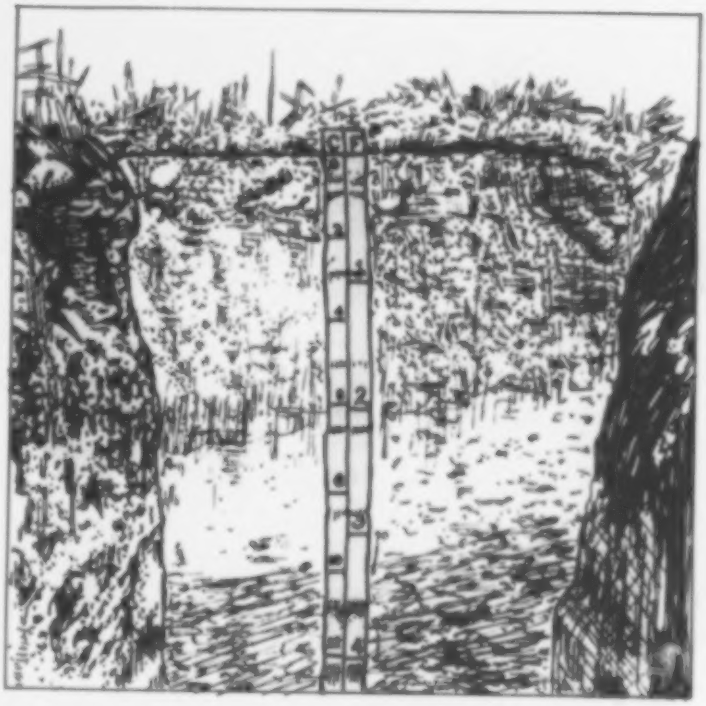
OBJECTIVE 2

List ways rocks are broken down to form soil.

Where does soil come from? You may know that decaying organic matter can form humus, the top layer of soil, but soil is mainly produced from rocks (also called parent material). It is actually very tiny pieces of rock or material that was once part of a rock.

NOTE: It takes about 40 years to make one inch of topsoil.

The upper layer of soil mixed with organic matter is called **topsoil**. The lower soil layer, which contains little or no organic matter, is called **subsoil**. The topsoil is the soil needed to grow healthy plants.



Rocks are broken down in several ways. These ways include:

- Erosion
- Water running over the rock, carrying away small particles
- Water seeping into cracks in the rock and freezing, breaking off pieces of the rock
- Movement of glaciers carrying away particles
- Streams carrying and breaking down pebbles
- Plants growing on or near rocks breaking them down, roots growing into cracks and breaking open the rock

- Carbon dioxide from plant roots dissolving in the soil and forming carbonic acid which wears away the rock

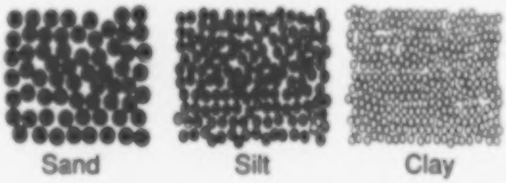
- Expansion and contraction of the rock due to heat from the sun

OBJECTIVE 3 **Label types of soil.**

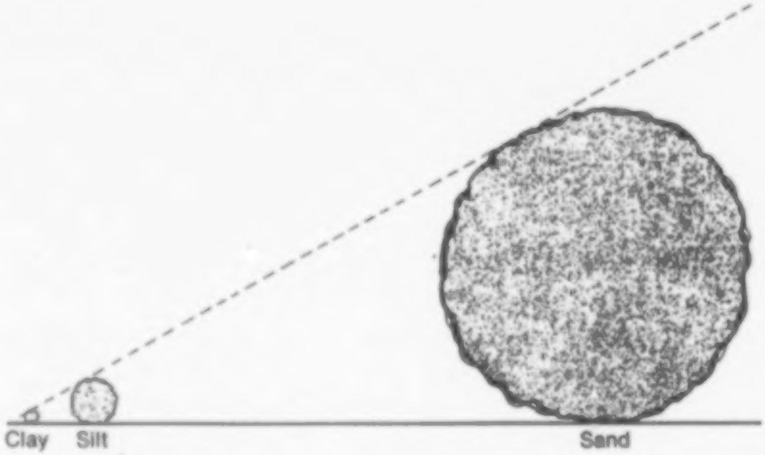
Soil is important for the growth of plants. It contains the moisture and nutrients the plants need. It stores moisture and nutrients for future use. The soil protects tender roots and supports the plant as it grows.

There are three basic types of soil. The type with the largest particles is sand. Silt is made of smaller particles that break up easily. The smallest soil particles are in clay. It feels sticky when wet and will form a long "worm" when it is rubbed between the thumb and fingers.

THREE TYPES OF SOIL

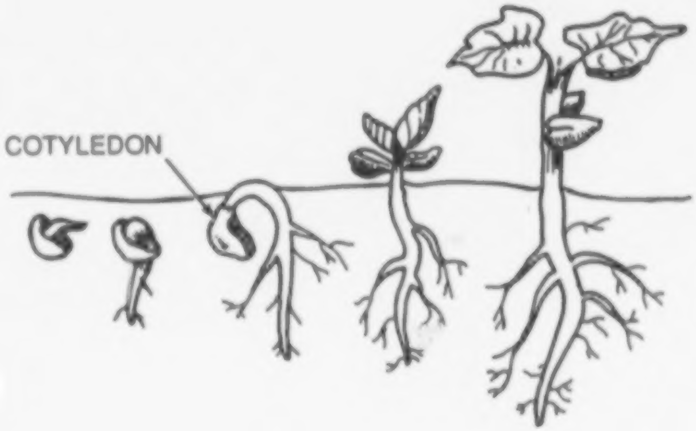


COMPARISON OF PARTICLE SIZES



OBJECTIVE 4 **Select from a list true statements about how plants work.**

Plants, like animals, go through a life cycle, from "birth" to death. Each seed contains a live plant, called an embryo. Germination takes place when the embryo grows large enough to break through the wall of the seed. Germination only occurs when moisture, temperature, oxygen, and light levels are correct. The seedling produces leaves and roots when it germinates. The first leaves are called cotyledons (cot-uh-LEE-duns); the second set of leaves are the first real leaves the plant grows.

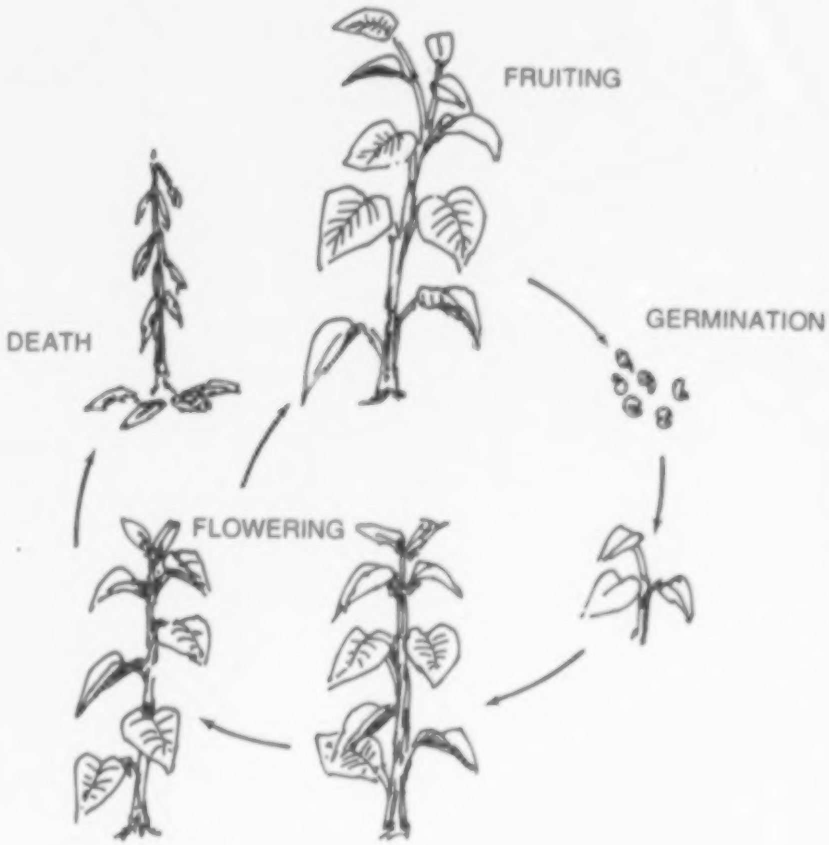


Leaves are very important to plants. They contain a chemical called chlorophyll that gives leaves their green color. The chlorophyll, carbon dioxide in the air, water in the leaves (supplied through the root system), and sunlight are used in a process called photosynthesis. Through this process, the leaves make sugars and oxygen. The sugars are distributed through the plant and are the plant's food. The moisture absorbed by the roots is not the plant's food supply but is necessary for photosynthesis. The oxygen produced by photosynthesis is important to our atmosphere and health.

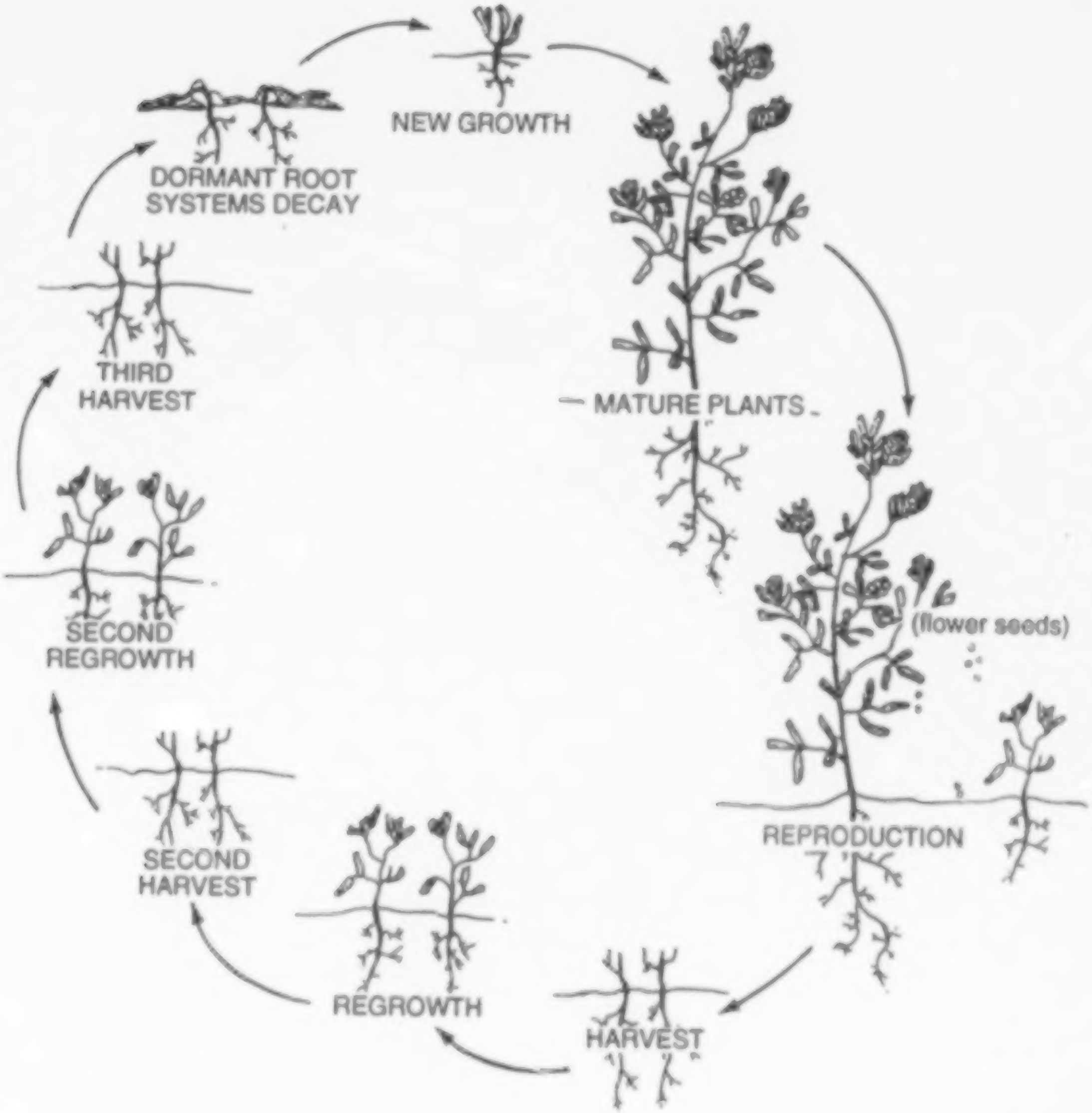
The mature plant has a full root system, stem, leaves, fruit, buds, seeds, and flowers. The flowers contain organs that produce pollen or fruit. Some plants have flowers that grow both. For example, the tassel at the top of a corn plant produces pollen, and the ears are flowers that grow fruit. Other plants only produce one type of flower. Holly plants, for example, may produce berries (fruit) or have no berries and produce pollen only.

To produce fruit and seeds, the pollen must be moved from the flower or flower-part that produced it (called the male) to the fruit-bearing flower or flower-part (called the female). Wind or insects usually do this. When the pollen reaches the female, the fruit and seeds begin to develop. This process is called reproduction.

For annuals, pollination is the beginning of the end. When the plant is pollinated, seeds are produced and distributed by falling, popping open, being blown by wind, or being carried by animals. When the seeds are dispersed, the plant and roots die. The dead plant decays, providing organic matter for the soil, and the life cycle is completed.



For perennials, the life cycle is longer. When seeds are produced, the plant does not die. It may continue to grow year-round or may die back in winter months then grow back again in the spring and summer.


NEW GROWTH
MATURE PLANTS
REPRODUCTION
(flower seeds)
HARVEST
REGROWTH
SECOND HARVEST
SECOND REGROWTH
THIRD HARVEST
DORMANT ROOT SYSTEMS DECAY

OBJECTIVE 5

Choose the word or phrase that completes statements about the importance of water and nutrients.

Water

We all know that plants need water. Without it, plants turn brown and dry. But what does the water actually do? It serves several purposes:

- Water dissolves nutrients. It can help break them down inside the plant and help the plant absorb them from the soil.
- Water moves nutrients through the soil to the plant and throughout all parts of the plant.
- Water is circulated through the plant and evaporated from the leaves to control the temperature of the plant.
- Water is needed for photosynthesis to occur.

Nutrients

Just as you require vitamins and minerals to grow and perform as you should, plants need nutrients to thrive.

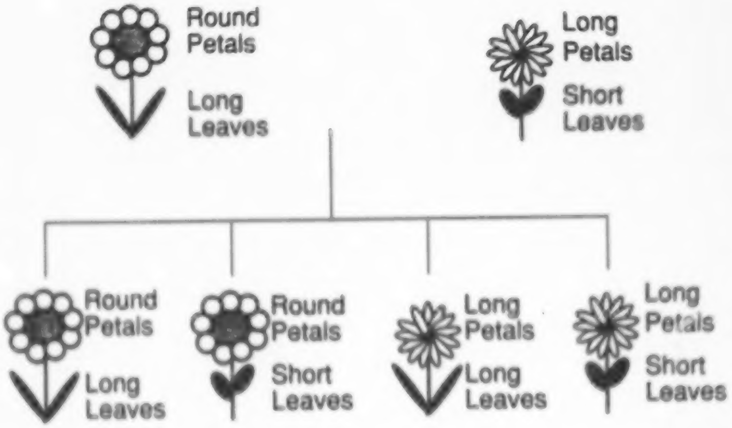
- Nutrients are needed to build strong stems and root systems.
- Nutrients are necessary for the production of chlorophyll. Without chlorophyll, photosynthesis cannot occur.
- Plants have to have the *right balance* of nutrients to produce good leaves and fruit.

OBJECTIVE 6

Choose the word or phrase that completes statements about plant breeding and genetics.

When any living thing reproduces, both parents pass on traits to the offspring. You may have your father's eyes or your mother's height. The traits may be passed on to even later generations. The science of how these traits are passed from parent to child is called genetics. Genetics is used in medicine, plant sciences, and animal husbandry. You might have learned about Mendel's experiments in your science class.

Each parent passes on genes. The genes contain information about how the offspring should grow and what characteristics it will inherit. Each gene is attracted to the gene from the other parent that controls the same set of characteristics. The mother's gene controlling flower petal color, for example, will pair with the father's gene controlling flower petal color. Each gene has two characteristics, (red petals and white petals, for instance) but when the genes pair, only one characteristic from each parent is passed on to the offspring. If the characteristics are the same, that will be the characteristic of the offspring. If they are different, the "dominant" or stronger characteristic will be passed on.



Why study genetics? Scientists see genetics as a path of many great discoveries. They hope to identify the genes that cause defects in people, animals, and plants, then find ways to correct or replace those genes. If they are able to isolate genes that make plants grow faster, stronger, or with more fruit, they can produce hybrids that will be easier to grow, more resistant to diseases and pests, and worth more money. Some plants and pesticides already on the market are the result of genetic studies.

But, to scientists, the real reason to study genetics is described by Dr. L. Herb Bruneau, Oklahoma State University, "It's DNA that binds all living things together. Whether you're a stalk of wheat or a frog or a person, it's the same. There's no language barrier...That's what I find amazing."

OBJECTIVE 7 **Match new plant technologies to their descriptions.**

Years ago, growing plants meant plowing, planting, and harvesting. But today, new plant technologies let us grow plants without soil, in water, and under water. As Earth's population grows, the need for new areas to farm will become increasingly important. When we begin long-term space exploration or colonization we will need to grow plants in small spaces without soil and sunlight. Several new technologies make this possible.

- **aeroponics** – growing plants with their roots exposed to the air by regularly spraying the roots with nutrient solutions

  EXAMPLE: Peppers

- **cloning** – the process of growing an exact replica of an organism from one of its cells

  EXAMPLE: Carrots

  NOTE: Cloning is also called "tissue culture."

- **hydroponics** – growing plants in water and nutrient solutions rather than in soil

  EXAMPLE: Rice, cabbage

- **undersea farming** – growing plants in the sea floor

  EXAMPLE: Seaweeds

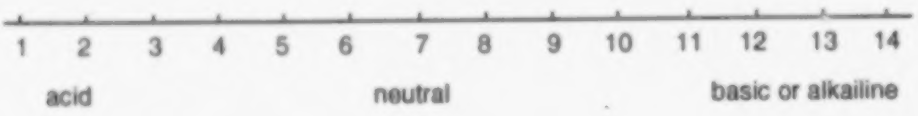
SOIL AND pH

When you read or hear people talking about soils and growing plants you will hear the term pH used.

What is pH?

The term pH is used by chemists, plant and soil specialists and people who grow plants. It indicates how acidic the soil is. Some soils are considered very acidic, while others may be neutral and still others may be alkaline.

Here is a chart to help explain pH



Here is how it works

1. A pH of 7 is considered neutral. It is neither acid or alkaline.
2. A pH below 7 is considered acid.
3. A pH above 7 is considered alkaline.

Most plants grow best when the soil has a pH of 6 to 6.5. However, some plants, like blueberries and azaleas, will do best in soils with a pH of 5 to 5.5. Other plants, such as alfalfa do better in a more alkaline soil.

If soils are too acidic the grower can add limestone to the soil to raise the pH. If it needs to be more acidic, sulfur can be added.

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PREFERRED pH LEVELS FOR SELECTED PLANTS

pH 5.0-5.5	5.5-6.0	6.0-6.5	6.5-7.5
Strongly acid	Medium acid	Moderately acid to slightly acid	Slightly acid to slightly alkaline
Irish potato	Alfalfa	Apples	Bermuda grass
Watermelon	Cabbage	Corn	Oats
	Red clover	Cowpeas	Pecans
	Spinach	Cotton	Millet
	White clover	Peanuts	Rye
	Sweet clover	Peas	Sweet Potatoes
		Peppers	Strawberries
		Sorghums	
		Soybeans	
		Sweet corn	
		Tomatoes	
		Wheat	

JOB SHEET 1

Development of:
READING SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Locating resources
  - Following written instructions

  SCIENCE SKILLS

  - Collecting specimens
  - Investigating physical characteristics of the earth

  EMPLOYABILITY SKILLS

  - Practicing good work habits/attitudes

- If students have difficulty locating resources:
  - Discuss different ways of obtaining the information.
  - Invite a librarian to discuss available resources and how to use them.
- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty collecting specimens:

  - Review procedure for collecting samples.

  - Explain the necessity for keeping samples separate and labeled, and uncontaminated.

  - Allow students to practice collecting samples before completing the job sheet.

- If students have difficulty investigating physical characteristics of the earth, review soil types and soil analysis.

- If students have difficulty developing good work habits/attitudes:

  - Encourage them to become familiar with the entire procedure before they begin the work.

  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.

  - Discuss what behaviors and attitudes constitute good work habits.

  - Make sure the student knows what is expected of him or her.

JOB SHEET 1

PLANTS AND SOILS

IV

OBJECTIVE 8

Take a soil sample.

INTRODUCTION

Have you ever wondered what the soil around you is made up of? By taking samples of soils and having them analyzed by your county extension office you can find out.

EQUIPMENT AND SUPPLIES

- Spade
- Clean, non-metallic bucket
- Box or sack large enough to hold about one pint of soil (available from your county extension agent)
- Address of your county extension agent
- Soil test request form (available from your county extension agent)

PROCEDURE

1. Dig a narrow hole about six inches deep.

   NOTE: Choose digging sites carefully. Avoid wet spots, areas near fences or walls, or areas that have been fertilized more than others.

2. Remove a thin slice of soil from the side of the hole and place it in the clean bucket.
3. Refill the hole.
4. Repeat steps 1-3 until 20 samples have been taken.
5. Mix all the samples with the shovel.
6. Remove about 1 pint of the soil and place it in the container supplied by your county extension agent.
7. Complete the soil test request form and attach it to the container of soil.
8. Take the container and request form to your county extension agent for evaluation.
9. Have instructor check your work.
10. Put tools and materials away and clean your work area.

Research and Reference Skills
- Locate resources

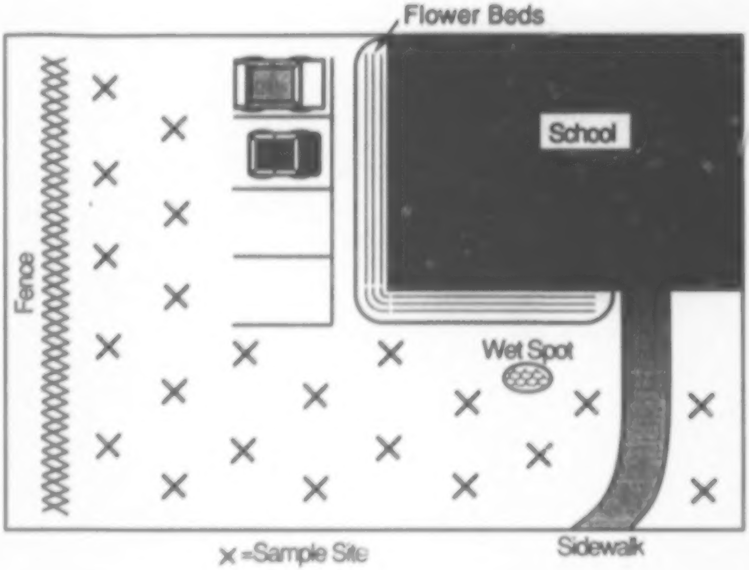
Functional Reading Skills
- Follow written instructions

General Science Skills
- Collect specimens

Earth Science Skills
- Investigate physical characteristics of the earth

Job Acquisition/ Development Skills
- Practice good work habits/attitudes

DIGGING SITES


Flower Beds
School
Fence
Wet Spot
Sidewalk
× =Sample Site

276

JOB SHEET 2

Development of:
READING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  – Following written instructions

  SCIENCE SKILLS

  – Analyzing/classifying matter

  – Investigating forms/changes of matter

  – Investigating physical characteristics of the earth

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  – Creating a finished product

  – Transferring knowledge/training to new situations

  EMPLOYABILITY SKILLS

  – Practicing good work habits/attitudes

- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty analyzing/classifying matter, review the categories for classification.

- If students have difficulty investigating forms/changes of matter:
  - Discuss evaporation.
  - Encourage students to compare samples and share their descriptions.
- If students have difficulty creating a finished product:
  - Review the analysis and synthesis of information to determine whether the conclusions are correct.
  - Review the action plan to determine whether it will bring the desired results.
  - Discuss the way in which the finished product is organized.
- If students have difficulty transferring knowledge/training to new situations:
  - Review the pertinent training. Compare the new situation to the training situation.
  - Examine ways in which training can be used in the new situation.
- For additional suggestions on teaching Basic Skills, refer to Instructional Supplement 1.

JOB SHEET 2

PLANTS AND SOILS

IV

OBJECTIVE 9

Make a soil cluster display.

INTRODUCTION

Different soils have differing characteristics. Making a soil cluster sample can help you visually identify soil types.

EQUIPMENT AND SUPPLIES

- Soil samples from several locations
- Water
- Bucket
- Display area
- Pen and paper

PROCEDURE

1. Mix each soil sample with water. Be sure to keep the samples separate.
2. Make a mudball from each sample.
3. Label each mudball with the location the soil was taken from.
4. Let the mudballs dry.
5. Make additional labels for each mudball, listing what you can tell about the soil from the mudball. Use the information below.

Sand

- Drains quickly
- When dry, feels loose and single grained, gritty
- When wet, forms easily-crumbled ball

Silt

- When dry, feels smooth, soft and flour like, shows fingerprints; makes hard-to-break clods
- When wet, feels smooth, slick like butter; stains fingers

Functional Reading Skills
- Follow written instructions

Physical Science Skills
- Investigate forms/changes of matter

Earth Science Skills
- Analyze/classify matter
- Investigate physical characteristics of earth

Cognitive Activities Skills
- Create a finished product
- Transfer knowledge/training to new situations

Job Acquisition/ Development Skills

- Practice good work habits/attitudes

Clay

- When dry, extreme pressure is required to break clods by hand
- When wet, sticky, and clay-like; stains fingers

Loam

- When dry, feels somewhat gritty; clods are somewhat hard to break by hand
- When wet, feels neither very gritty nor very smooth; forms a firm ball; stains fingers

6. Have instructor check work.

7. Clean work area.

JOB SHEET 3

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  – Following written instructions

  MATHEMATICS SKILLS

  – Using English & metric measures

  – Collecting/recording data

  – Making measurements

  SCIENCE SKILLS

  – Conducting experiments

  – Using scientific instruments (ruler)

  – Analyzing/classifying matter

  – Investigating physical characteristics of the earth

  EMPLOYABILITY SKILLS

  – Practicing good work habits/attitudes

- If students have difficulty using English and metric measures or making measurements:
  - Suggest that they look at a yardstick or tape that is marked in both English and metric and study the measurements until there is a concrete idea about the lengths of different units of measurement.
  - Review the units of measure.
- If students have difficulty collecting and recording data:
  - Stress the importance of accuracy in recording data.
  - Discuss the structure of the forms being used.
- If students have difficulty conducting experiments:
  - Explain the importance of learning for themselves, through observation, how different factors can influence the outcome of a specific or a set of circumstances or events.
  - Explain the importance of having verifiable facts to consider.
- If students have difficulty using scientific instruments (ruler), review the correct procedure for its use.
- For additional suggestions on teaching Basic Skills, refer to Instructional Supplement 1.

JOB SHEET 3 — PLANTS AND SOILS — IV

OBJECTIVE 10

Measure the amount of water absorption in soils.

INTRODUCTION

Soils vary in the amount of water they can absorb. Have you ever noticed how some areas remain mushy long after the rain stops and other areas dry quickly? There are many factors that affect water absorption in soils. By measuring absorption rates you can see how these factors affect absorption.

EQUIPMENT AND SUPPLIES

- 6 large tin cans
- A board 12″ × 4″ × 1″
- Hammer
- Ruler
- Watch with a second hand
- Pencil and report form
- Quart measure
- 2 gallons of water
- Metal snips
- Can opener
- Felt marker

PROCEDURE

1. Use the can opener to open one end of each tin can.

2. Use the metal snips to cut off the other end of the can below the rim.

3. Measure two inches from the snipped end of the can. Mark it with the felt marker.

4. Find six places to measure soil absorption. Look for these six:

   - A place with leaves or other mulch at least ½″ thick
   - A place with heavily packed soil but covered
   - A place with heavily packed soil and uncovered
   - A place where the soil has never been plowed (along a fence is a good place to look)
   - A place with exposed subsoil
   - A place with exposed topsoil that is not heavily packed

5. At each location, put a can, snipped side down, on the ground. Lay the board across the other end of the can. Hammer the board until the can is in the soil up to the two inch mark. Do not disturb the soil or what is on top of it. Avoid sticks or rocky areas.

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English & metric measures

Data Analysis and Display Skills
- Collect/record data

Functional Math Skills
- Make measurements

General Science Skills
- Conduct experiments
- Use scientific instruments (ruler)

Physical Science Skills
- Analyze/classify matter

Earth Science Skills
- Investigate physical characteristics of the earth

6. Measure one quart of water and pour it into the can.

7. Write the location, a description of the soil and its covering, the distance from the top of the can to the top of the water, and the time the water was added on the report form.

8. Check back in ten minutes. Measure the distance from the top of the can to the top of the water again and write it down.

9. Continue to monitor the cans throughout the day.

10. Have instructor check your work.

11. Clean work area.

Location	Description of soil and covering	Distance from top of can	Time	10 minute measurement

Job Acquisition/ Development Skills
- Practice good work habits/attitudes

JOB SHEET 4

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  MATHEMATICS SKILLS

  - Using English & metric measures
  - Collecting/recording data
  - Construct charts & tables
  - Making measurements

  SCIENCE SKILLS

  - Conducting experiments
  - Using scientific instruments (ruler)
  - Investigating forms/changes of matter

  EMPLOYABILITY SKILLS

  - Practicing good work habits/attitudes

- If students have difficulty constructing charts and tables:

  - Discuss with them the fact that the purpose of graphs is to represent numerical values in a visual form.

  - Remind them to leave enough vertical room to accommodate the maximum amount of information they may have to record.

- For additional suggestions on teaching Basic Skills, refer to Instructional Supplements 1-3.

JOB SHEET 4

PLANTS AND SOILS

IV

OBJECTIVE 11

Grow plants in various soils.

INTRODUCTION

Plants grow in varying soils. Some soils, however, are more suited to growing healthy, productive plants. By growing plants in various types of soil you can see which soils are better for plants.

EQUIPMENT AND SUPPLIES

- Notebook with paper
- Ruler
- Pencil
- 10 flowerpots
- 30-40 beans
- Gardening spade
- Soils
- Masking tape and a felt marker
- Water
- Fertilizer

PROCEDURE

1. Clean each flower pot. Fill each flowerpot with a different soil. Soils might be:
    - Loam
    - Sand
    - Clay
    - Soil with a high pH
    - Soil with a low pH
    - Soil with a neutral pH
    - Subsoil
    - Potting soil
    - Soil from your schoolyard
    - Soil from your schoolyard with fertilizer
    - Eroded soil
2. Label each flowerpot by writing the type of soil on a piece of masking tape and putting it on the pot.
3. Soak the beans overnight in water.
4. Place 3-4 beans in each flowerpot, about 1/2" under the soil.
5. Place the flowerpots in a window or under grow lights.

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English & metric measures

Data Analysis and Display Skills
- Collect/record data
- Construct charts & tables (numerical)

Functional Math Skills
- Make measurements

General Science Skills
- Conduct experiments
- Use scientific instruments (ruler)

Physical Science Skills
- Investigate forms/changes of matter

Job Acquisition/ Development Skills
- Practice good work habits/attitudes

6. Make a chart for each plant. Write the soil type at the top of the page. Make three columns. Label one "Date," the second one "Height and Appearance," and the third one "Care Given."

7. On the back of each page, write how you think the soil will affect the plant's growth.

8. Care for the plants over the next month. Twice a week, care for the plant and measure it. Note your work in the notebook.

9. At the end of the month, compare the plant's progress to your prediction.

10. Have instructor check your work.

11. Clean work area.

JOB SHEET 1

Take a soil sample.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Dug a narrow hole about six inches deep	___	___
2. Removed a thin slice of soil from the side of the hole and placed it in the clean bucket	___	___
3. Refilled the hole	___	___
4. Repeated steps 1-3 until 20 samples were taken	___	___
5. Mixed all the samples with the shovel	___	___
6. Filled out soil test form and attached it to sample	___	___
7. Used proper tools correctly	___	___
8. Performed steps in a timely manner	___	___
9. Practiced safety rules throughout procedures	___	___

10. Provided satisfactory responses to questions asked ___ ___

11. Put away tools and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Took soil samples properly	4	3	2	1
Mixed and prepared soil properly	4	3	2	1
Filled out soil test form correctly	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 2 — PLANTS AND SOILS — IV

JOB SHEET 2

Make a soil cluster display.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Mixed each soil sample with water, keeping the samples separate	___	___
2. Made a mudball from each sample	___	___
3. Labeled each mudball with the location the soil was taken from	___	___
4. Let the mudballs dry	___	___
5. Made additional labels for each mudball, listing conclusions	___	___
6. Used proper tools correctly	___	___
7. Performed steps in a timely manner	___	___
8. Practiced safety rules throughout procedures	___	___
9. Provided satisfactory responses to questions asked	___	___
10. Put away tools and cleaned work area	___	___

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Made mudballs	4	3	2	1
Reached logical conclusions	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3

PLANTS AND SOILS

IV

JOB SHEET 3

Measure the amount of water absorption in soils.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. ____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Used the can opener to open one end of each tin can	___	___
2. Used the metal snips to cut off the other end of the cans below the rim	___	___
3. Measured two inches from the snipped end of the can and marked it with the felt marker	___	___
4. Found six places to measure soil absorption	___	___
5. At each location put a can, snipped side down, on the ground, then laid the board across the other end of the can, and hammered the board until the can was in the soil up to the 2" mark	___	___
6. Measured one quart of water and poured it into each can	___	___

7. Wrote down the location, a description of the soil and its covering, the distance from the top of the can to the top of the water, and the time the water was added ___ ___

8. Rechecked and remeasured ___ ___

9. Used proper tools correctly ___ ___

10. Performed steps in a timely manner ___ ___

11. Practiced safety rules throughout procedures ___ ___

12. Provided satisfactory responses to questions asked ___ ___

13. Put away tools and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Set up project properly	4	3	2	1
Conducted project properly	4	3	2	1
Kept appropriate records	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 4

Grow plants in various soils.

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Cleaned each flowerpot and filled each flowerpot with a different soil	___	___
2. Labeled each flowerpot by writing the type of soil on a piece of masking tape and putting it on the pot	___	___
3. Soaked the beans overnight in water	___	___
4. Placed 3-4 beans in each flowerpot, about ½" under the soil	___	___
5. Placed the flowerpots in a window or under grow lights	___	___
6. Made a chart for each plant	___	___
7. Made predictions	___	___
8. Cared for the plants and measured them as assigned	___	___
9. Compared the plant's progress to predictions	___	___

10. Used proper tools correctly ___ ___

11. Performed steps in a timely manner ___ ___

12. Practiced safety rules throughout procedures ___ ___

13. Provided satisfactory responses to questions asked ___ ___

14. Put away tools and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Participated in class discussions	4	3	2	1
Cared for plant, as assigned	4	3	2	1
Arrived at logical conclusions	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

PLANTS AND SOILS

IV

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with plants and soils to their definitions. Write the correct letters in the blanks.

_____ 1. A plant that completes its life cycle from seed to plant, flower, and new seed in one year or less

_____ 2. A plant that lives two or more years but is able to produce seeds the first year

_____ 3. Lower soil level with little or no organic matter

_____ 4. The changes in an organism from the beginning of life to the end of the organism's life

_____ 5. The most desirable type of soil; includes organic matter, soil particles of various sizes, and nutrients

_____ 6. The process in which plants convert carbon dioxide, sunlight, and chlorophyll into foods they need

_____ 7. The process in which pollen is moved from male plants or plant parts to female plants or plant parts

_____ 8. The process of fertilization and seed growth

_____ 9. Upper soil level with organic matter

_____ 10. When a seed "opens" and sends out roots and stems

a. annual
b. compost
c. cross-pollination
d. fertilization
e. germination
f. humus
g. life cycle
h. loam
i. perennial
j. photosynthesis
k. pollination
l. reproduction
m. respiration
n. subsoil
o. topsoil

May be photocopied for student use.

OBJECTIVE 2

List ways rocks are broken down to form soil. List five ways in the spaces below.

1. ______________________________

____

2. ______________________________

____

3. ______________________________

____

4. ______________________________

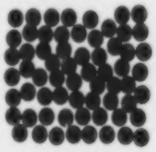
____

5. ______________________________

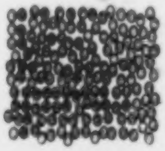
____

OBJECTIVE 3

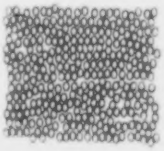
Label types of soil. Write the names in the blanks.



1. __________



2. __________



3. __________

OBJECTIVE 4

Select from a list true statements about how plants work. Write an "X" in the blank before each true statement.

_____ 1. Each seed contains a live plant, called an embryo.

_____ 2. Leaves are not important to photosynthesis.

_____ 3. Germination only occurs when moisture, temperature, oxygen, and light levels are correct.

_____ 4. The second set of leaves are the first real leaves the plant grows.

May be photocopied for student use.

_____ 5. Seeds contain chlorophyll and nitrogen that soften the shell and help it grow roots.

_____ 6. Germination is not affected by environment.

_____ 7. Seeds can be dispersed by animals.

_____ 8. Roots contain chlorophyll.

_____ 9. Plants absorb food through their roots.

_____ 10. Chlorophyll in the leaves helps the plant produce sugars it needs.

_____ 11. Flowers contain organs that produce pollen or fruit.

_____ 12. Pollen is produced through photosynthesis.

_____ 13. When the pollen reaches the female, the fruit and seeds begin to develop.

_____ 14. When an annual plant is pollinated, seeds are produced and distributed, then the plant and roots die.

_____ 15. The major difference between annuals and perennials is the type of flower produced.

OBJECTIVE 5

Choose the word or phrase that completes statements about the importance of water and nutrients. Write the correct letter in each blank.

_____ 1. Water dissolves

a. nutrients
b. chlorophyll
c. sugars
d. clay

_____ 2. Water moves nutrients through soil to the plant and throughout

a. the plant to the soil
b. all parts of the plant
c. the leaves into the atmosphere
d. the stem to the roots

May be photocopied for student use.

_____ 3. Water is circulated through the plant and evaporated from the leaves to

a. control hydrogen levels in the plant
b. prevent water from pooling in the roots
c. control the temperature of the plant
d. keep the leaves from becoming too heavy

_____ 4. Water is needed for _____ to occur.

a. fertilization
b. photosynthesis
c. respiration
d. pollination

_____ 5. Nutrients are necessary for the production of

a. soil
b. pollen
c. chlorophyll
d. sugars

OBJECTIVE 6

Choose the word or phrase that completes statements about plant breeding and genetics. Write the correct letter in each blank.

_____ 1. Each gene pairs with

a. the gene from the offspring with the same information
b. any gene from the other parent
c. another gene from the same parent
d. the gene from the other parent with the same set of characteristics

_____ 2. Each gene has

a. two characteristics
b. one characteristic
c. no characteristics until it is paired
d. all the parent's characteristics

May be photocopied for student use.

_____ 3. When the genes pair,

a. only the dominant characteristic from each parent is passed on to the offspring
b. all characteristics in the gene are passed on to the offspring
c. paired genes can pass on characteristics
d. only one characteristic from each parent is passed on to the offspring

_____ 4. If the characteristics from the two parents are the same, that will be the characteristic of the offspring. If they are different,

a. the dominant characteristic will be passed on
b. a blend of the characteristics results
c. the genes are ignored
d. there is a 50-50 chance that either one will be passed on

OBJECTIVE 7 **Match new plant technologies to their descriptions.** Write the correct letter in the blanks.

_____ 1. Growing plants in water and nutrient solutions rather than in soil

_____ 2. Growing plants in the sea floor

_____ 3. Growing plants with their roots exposed to the air and regularly spraying the roots with nutrient solutions

_____ 4. The process of growing an exact replica of an organism from one of its cells

a. aeroponics
b. cloning
c. cuttings
d. hydroponics
e. hyperbola
f. neutroponics
g. saltwater farming
h. undersea farming

NOTE: Objectives 8-11 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

PLANTS AND SOILS

IV

OBJECTIVE 1

1. a
2. i
3. n
4. g
5. h
6. j
7. k
8. l
9. o
10. e

OBJECTIVE 2

Answers should include any five of the following:

- Erosion
- Water running over the rock, carrying away small particles
- Water seeping into cracks in the rock and freezing, breaking off pieces of the rock
- Movement of glaciers carrying away particles
- Streams carrying and breaking down pebbles
- Plants growing on or near rocks breaking them down, roots growing into cracks and breaking open the rock
- Carbon dioxide from plant roots dissolving in the soil and forming carbonic acid which wears away the rock
- Expansion and contraction of the rock due to heat from the sun

OBJECTIVE 3

1. Sand
2. Silt
3. Clay

OBJECTIVE 4

1, 3, 4, 7, 10, 11, 13, 14

OBJECTIVE 5	1.	a
	2.	b
	3.	c
	4.	b
	5.	c
OBJECTIVE 6	1.	d
	2.	a
	3.	d
	4.	a
OBJECTIVE 7	1.	d
	2.	h
	3.	a
	4.	b

OBJECTIVE SHEET

HORTICULTURE

V

INTRODUCTION

Without even realizing it, you may be making money, thanks to the field of horticulture. If you mow lawns, trim hedges, or water lawns, you are part of the horticulture industry. You are also part of this field if you raise or sell plants, flowers, nuts, fruits, or vegetables. Plant and soil researchers, quality control assistants, greenhouse managers, accountants, flower shop sales people, floral designers, golf course designers, sod farmers, greenhouse workers, and so many others are also members of the horticulture field.

Horticulture is a major industry in Oklahoma, and one of today's most promising career options. Green houses and nurseries make up the fourth largest agricultural industry in Oklahoma, according to the 1990 Oklahoma Ag Profiles. Experts who study trends and job opportunities agree that horticulture is an increasingly important field.

UNIT OBJECTIVE

After completing this unit the student will be able to recognize true statements about the importance of horticulture, the different careers included in the science, and basic regeneration and landscape architecture methods. The student will demonstrate these competencies by completing job sheets, practical tests, and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to:

1. Match terms associated with horticulture to their definitions.
2. Select from a list true statements about the effect of plants on people.
3. Choose the word or phrase that completes statements about careers in horticulture.
4. Describe methods of regeneration.
5. Plan a landscape scale drawing for your schoolyard. (Job Sheet 1)
6. Grow plants using various regeneration methods. (Job Sheet 2)

PREPARATION

- Obtain materials to supplement the unit. You will need photographs of landscape designs and horticulture operations; a scale drawing of your school yard; seeds, seed trays, pots and other equipment and materials listed in Job Sheets 1 and 2; and a video camera, tape, player, and television.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Make arrangements for students to visit a local greenhouse, sod farm, fruit orchard, grove of nut trees, or other horticultural site.
- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with horticulture to their definitions.

- Review terms in Unit 4, "Plants and Soils" and relate them to terms listed here.
- Use information in Student Supplement 1, "Horticulture in Oklahoma" to introduce the unit.
- Discuss why grafting is used. Present examples of grafted trees.

- Use horticultural magazines listed in Suggested Resources as a source of illustrations to display in class. These also include short, accurate articles that might be included in classroom presentations.

- Collect newspaper stories that relate to horticulture. Review the stories or post them to show students the wide realm of horticulture.

- Have students list what snacks they ate yesterday and determine how many of them were horticultural products.

- Discuss the importance of the taproot. Explain that when plants are transplanted, the taproot must be protected.

Objective 2: Select from a list true statements about the effect of plants on people.

- Invite an art teacher or local artist to discuss aesthetics.

- Have each student survey one block of your downtown area and list examples of horticulture they find.

- Have students survey school landscaping or the landscaping around another public building. Point out use areas, exposure, and focal points.

- Invite an herbalist to discuss how plants can be used for medicine.

- Have students bring plants into a school hallway and arrange them attractively. Have them observe the behavior of people around the plants and see if adding them affects student behavior.

- Have students read and discuss Student Supplement 2, "Plants and Prisons."

- Discuss the importance of aesthetics in everyday life.

Objective 3: Choose the word or phrase that completes statements about careers in horticulture.

- Display photos or other examples of horticultural work. Include local landscaping, farms, greenhouses, and family gardens as well as national sites.

- Have students list the careers related to horticulture or the number of horticultural products with which they are familiar.

- Arrange for students to visit a greenhouse or nursery.

- Arrange for students to visit a vegetable or fruit farm.
- Compare nurseries to greenhouses. Invite representatives from each to discuss their businesses.
- Show video, *Horticulture and Landscape Architecture: The Future is Now.*" This film explores careers in horticulture, landscape construction, and landscape architecture and educational opportunities. It is available from all Oklahoma county extension agents.
- Contact your local high school guidance counselor for the most recent information on career possibilities. Show students that horticulture is a very promising area.

Objective 4: Describe methods of regeneration.

- Invite a greenhouse worker or horticulturist to demonstrate methods of regeneration.
- Have students prepare a poster demonstrating one method.
- Invite local gardeners to demonstrate regeneration and maintenance. You may locate willing volunteers through your local garden club or retirees organizations.
- Have students complete the Activity Sheet.

APPLICATION

Objective 5: Plan a landscape scale drawing for your schoolyard.

- Introduce students to landscaping by showing them a variety of considerations, styles, and solutions.
- If time allows, teach some basics of scale drawing, surveying, or other related activities.
- Providing a proposed scale drawing of landscaping leading up to one entrance of your school will be more effective than providing a drawing of the whole school.
- Invite a local architect or landscape architect to work with students as they design their landscapes. Have them provide illustrations of landscape designs they have completed.

- Provide a variety of photographs of landscaped yards and gardens. Include photos with pools, desert settings, formal and informal gardens, etc.

- After all the plans have been reviewed, have the class agree on an improvement plan and submit it to the principal or school board.

- Use Student Supplements 3-6 to help students choose appropriate plants for their plan.

Objective 6: Grow plants using various regeneration methods.

- Either have each student complete each type of regeneration or divide the class into groups and have each group demonstrate one method to the class.

- Have the class video tape the regeneration methods. The tape cân be used by later classes, other classes such as biology, local garden clubs, or local youth groups.

EVALUATION

Pretest

- Give written test as pretest.

- Determine individual study requirements.

- Counsel students individually on pretest results and study requirements.

- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.

- Describe the rating scale used on the practical test.

- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give written test.

  NOTE: The written test may be given in sections if desired.

- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Careers in Horticulture.* Vocational Media Associates, Box 3000, Mt. Kisco, NY 10549. Career opportunities are shown through interviews with people in various horticulture fields. (2 filmstrip set with teacher's guide)

- *Fresh Washington Apples: A Growing Tradition.* Washington Apple Commission, P. O. Box 18, Wenatchee WA 98807. Covers the entire production of apples, from planting through harvest. Pruning, pollination, watering, blooming, and thinning are also discussed. (18 minutes, color, VHS)

- *Horticulture and Landscape Architecture: The Future is Now.* Explores careers in horticulture, landscape construction, landscape architecture, and educational opportunities. Available from Oklahoma county extension agents. (VHS)

- Oklahoma State University, Agricultural Information, Stillwater, OK 74078. Copies of all "Oklahoma Gardening" television programs are on file and available for check-out. These programs are broadcast on Oklahoma PBS stations each weekend and have a viewing audience of over 150,000.

- *Peanut News and Views.* Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709. Covers peanut production, harvest, use, and nutritional value. Available for free loan. (15 minutes, color, 16 mm or VHS)

- *That's No Tomato, That's A Work of Art!* PBS Video, 1320 Braddock Place, Alexandria VA 22314-1698. Discusses of tomato varieties and the amount of work currently going into producing improved varieties. (30 minutes, color, VHS)

- Check your local listings for *Victory Garden* and *Oklahoma Gardening* broadcasts.

Print Media

- *Growlab A Complete Guide To Gardening in the Classroom.* National Gardening Association, 180 Flynn Avenue, Burlington VA 05401. A book with reproducible illustrations and clear instructions for indoor-growing of vegetables and flowers, instruction suggestions, and plans for a Growlab Indoor Garden.
- *Horticulture, the Magazine of American Gardening.* Includes articles covering all horticultural fields and artwork suitable for display. To order, write Horticulture, The Magazine of American Gardening, P.O. Box 53879, Boulder, CO 80321.
- *The National Gardening Association Guide to Kid's Gardening.* National Gardening Association, 180 Flynn Avenue, Burlington VA 05401. A book including over 70 activities as well as planning and instruction tips. Formerly titled *The Youth Gardening Book.*
- Oklahoma State University publishes a monthly Horticultural Tips Newsletter. This newsletter is distributed to all county extension agents. Contact your county extension office for copies or further information.
- *Taunton's Fine Gardening.* Features short, accurate articles on a wide variety of horticultural topics and includes photographs and illustrations suitable for display. Order from Taunton's Press, 63 South Main Street, P.O. Box 5506, Newtown, CT 06470-5506.
- *The Wayside Garden Catalog.* Published twice a year, spring and fall. It features excellent photographs, accurate, concise descriptions of all plants and flowers, and informative sidebar information. Offers an educational discount. Order by calling 800-845-1124.

Software

- *Agricultural Skills Unlimited.* Agri-Education, Inc., 815 Shakespeare, Stratford, IA 50240. Explores careers in horticulture and related fields. Apple-compatible software with teacher's guide and student's manual.

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INFORMATION SHEET

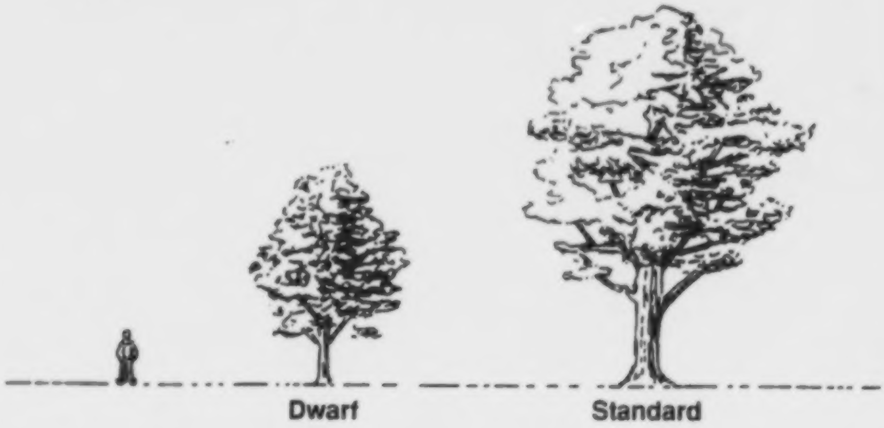
HORTICULTURE V

OBJECTIVE 1

Match terms associated with horticulture to their definitions.

- **aesthetics** – beauty and art in all forms
- **dwarf plants** – plants that have been genetically designed to be smaller than normal plants of the same type

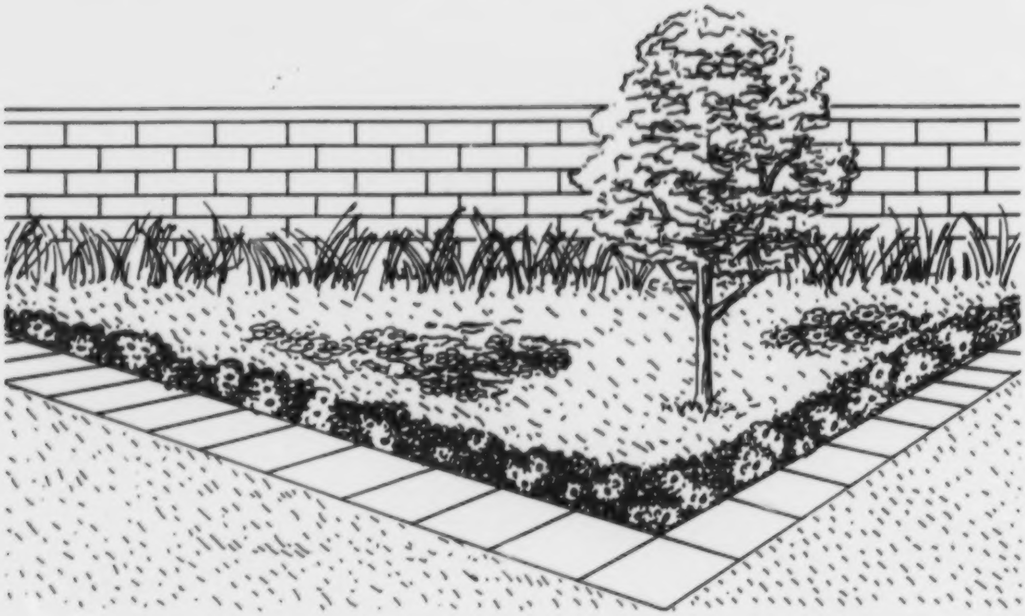
  NOTE: Dwarf plants are preferred by people with limited space. A dwarf peach tree, for example, can be grown in a small back yard, or even in a container kept on an apartment balcony.



- **exposure** – the amount of sunshine that regularly falls on a location
- **floral design** – arranging flowers and greenery attractively in pots, window boxes, flower beds, corsages, bouquets, etc.
- **focal point** – the part of an arrangement that stands out or attracts attention

  NOTE: Focal points are also called centers of interest.

FOCAL POINT



- **grafting** – binding a shoot or bud of one plant to a stem or trunk of another in a way that allows them to grow together
- **growing medium** – a mix of organic and inorganic matter that plants are generated and grown in

  NOTE: Growing medium is sterile, meaning it does not contain bacteria, insects, or other pests found in soil. It also lacks nutrients, which must be added to the growing media or water.

WHAT'S IN IT?

There are many different growing mediums, but most of them have the same components. The most common are:

peat moss – partially decomposed plant matter from bog areas

pine bark – bark from pine trees (Oak, redwood, and fir bark can also be used)

sphagnum moss – dried stems and leaves of bog plants

perlite – crushed and heated volcanic rock

vermiculite – pieces of mica that have been heated

- **hardiness** – a plant's ability to withstand stress

  EXAMPLES: Extremes of temperature and moisture, pest and disease, nutrient deficiencies

- **horticulture** – the agricultural science that studies fruits and vegetables, flowers, nuts, greenhouse plants, and ornamental plants
- **interiorscapes** – the arrangement of plants, flowers, etc., inside homes or buildings
- **landscaping** – the arrangement of plants, flowers, fences, paths, and other ornaments and structures outside homes or buildings

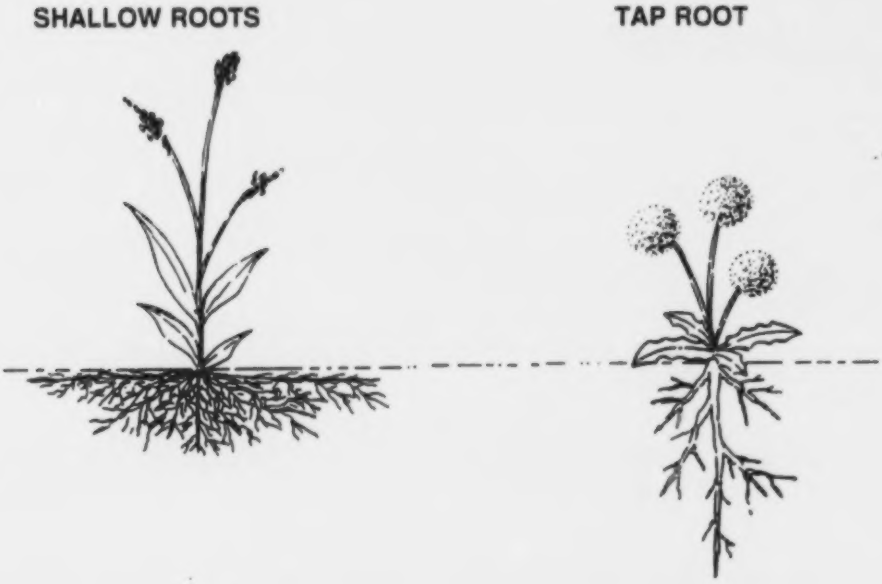
When George Washington retired from the Presidency and moved to Mount Vernon, he hired a landscape architect, Batty Langley. Mr. Langley had written a book on the subject several years earlier and President Washington had been a fan of his throughout the Revolutionary War.

Langley designed a totally new style of garden. His garden was less formal and left part of the landscape "wild." This new style, called "American gardening," symbolized the new nation and people like Washington, who had broken away from Britain. But it wasn't designed by an American. Langley was English.

- **nursery** – a business that produces, harvests, and sells ornamental trees and shrubs
- **regeneration** – growing a new plant

- **spread** – the width of a mature plant
- **taproot** – the main root of some types of plants

NOTE: Some plants have more shallow, fibrous root systems that lie close to the surface. A tap root grows deeper to get moisture.



OBJECTIVE 2

Select from a list true statements about the effect of plants on people.

Plants are everywhere! They're in parks and gardens, of course, but now they're also in stores, offices, schools, and hospitals. Why all this interest in plants? Do they just look good? Is it just fashionable, or is there another reason?

People have gathered and displayed flowers and plants for centuries. Simply having them nearby lifted people's spirits and brightened their homes. Aesthetics, arrangements pleasing to the senses, satisfy an instinctive desire in people. We are drawn to what is attractive. Bringing beauty to our homes and our cities is important to our feelings about where we live and who we are.

This desire for beauty goes hand-in-hand with technological advances. In his book *Megatrends*, John Naisbitt first documented this relationship. He called it "High Tech/High Touch," and explained that as we rely more on technology, we are soothed by what we can know and control. Gardening, floral design, and many other horticultural activities are examples of the "high touch" he described.

Actually, research has proven that just being around plants is good for people's health. Research at the University of Delaware indicates that exposure to plants can lower blood pressure, relax muscles, and slow heart rates. Similar research in the Netherlands shows that people who tend gardens are more resistant to stress and heart attacks.

These findings are being used by many doctors and hospitals. You may notice plants in your doctor's waiting room. These interiorscapes aren't there by accident. They are there to help patients relax before seeing the doctor. Hospitals are also putting more plants in patient areas.

Even the earliest settlers in America knew plants could be important even if they weren't "useful." Their first seeds were for plants that produced food, could be used for medicines, or used in some other way. But within a few years of landing, Massachusetts Bay residents were ordering flower seeds from England.

Soon residents in all the colonies were decorating their yards with bright blossoms. Strolling past the fragrant yards became a favorite pastime, much to the displeasure of Puritan leaders. The Delaware legislature passed a law against strolling past gardens on Sundays, describing it as a "sinful pleasure."

It wasn't until 1784 (164 years after the Pilgrims arrived at Plymouth Rock) that the first seed company in America was founded. It was run by David Landreth and customers included Thomas Jefferson, James Monroe, and George Washington. Among the plants Mr. Landreth first cultivated were the garden tomato and the white potato.

OBJECTIVE 3

Choose the word or phrase that completes statements about careers in horticulture.

Just as agriculture as a whole is changing, horticulture is changing, too. Even though there are fewer family farms every year, more families are growing fruits and vegetables, flowers, and trees. Businesses are landscaping manufacturing plants as well as corporate offices. Cities nationwide are enacting landscaping ordinances outlining the amount of space that must be left green and landscaped on construction sites and around existing businesses. Golf courses, with their acres of manicured greens and fairways, are one of the fastest-growing industries in the country. Horticultural research expands yearly. Areas of research include hybrid grass and turf species and new growing methods and technologies. Greenhouses today offer plants from around the world. Poinsettias, Easter lilies, and other plants are generated and force-bloomed for holiday shoppers. Wholesale greenhouses and nurseries raise fresh and cut flowers, grasses, trees, and other plants, then transport them throughout the nation.

All this makes horticulture a good career choice. Many experts rate it as one of the fastest-growing job markets in America.

Some horticulture-related jobs do not require any training beyond high school, but these are usually low-paying, labor-intensive jobs. Higher paying jobs require some training. Vocational-technical schools frequently offer horticulture programs. Colleges also offer a variety of courses and degrees.

Horticulture students should have a good background in math, algebra, biology, and chemistry. Art instruction is important in landscape architecture, floral arrangement, and similar fields. Since many horticulture careers require giving instructions or updating information, good writing and public speaking skills are also important.

In 1991, there were two jobs for every college horticulture graduate.

OBJECTIVE 4

Describe methods of regeneration.

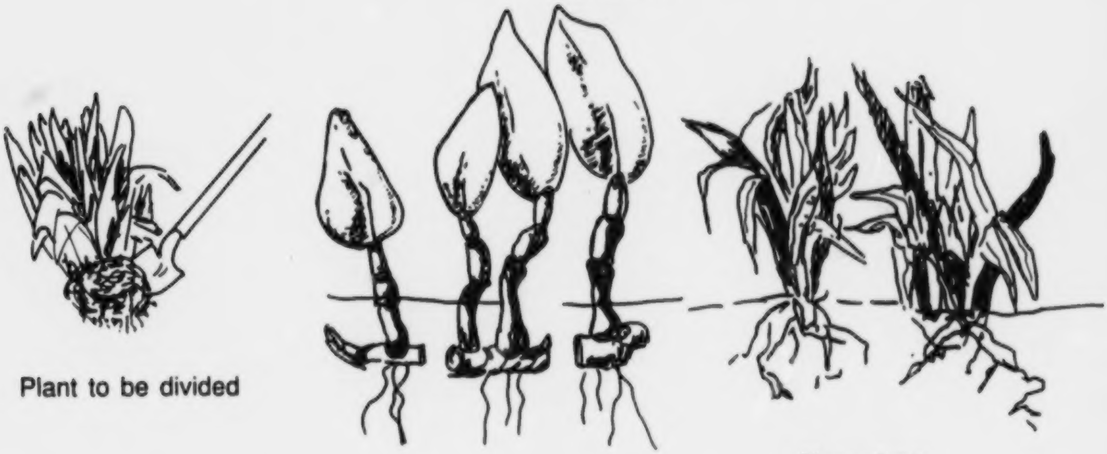
Horticulturists study how plants grow and how to grow them. They look at growing strong plants, producing healthy fruits and vegetables, finding species that meet the needs of farmers and gardeners, and new methods of growing plants.

Several methods of regeneration, are used to grow new plants:

- **seeds and seedlings** – cultivating the seeds of a plant. When seeds are used, they are planted directly in the ground or in containers, called flats. When seedlings are used, the seeds are planted in small containers until the first set of true leaves appear, then moved to the garden or larger containers.
- **division** – separating a plant and root system into two or more parts and planting them separately

  NOTE: Perennials can regenerate by division.

DIVISION



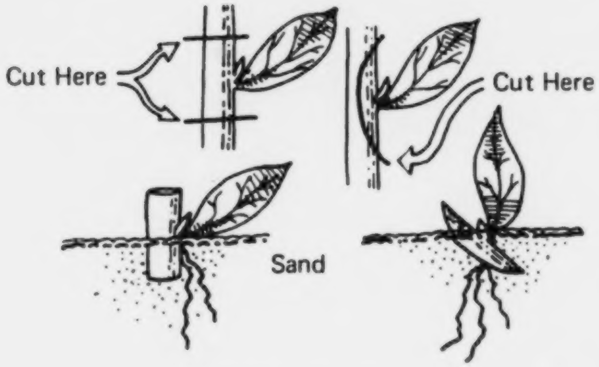
Plant to be divided

Root or Stem Section

New plants

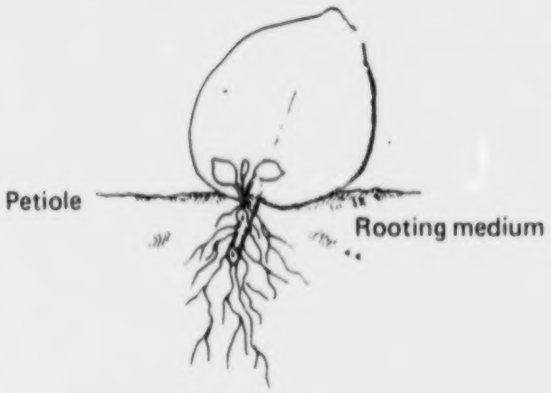
- **cuttings** – removing a part of a plant and allowing it to root, forming a new plant

LEAF CUTTING



Leaf-Bud Cuttings

LEAF-BUD CUTTINGS

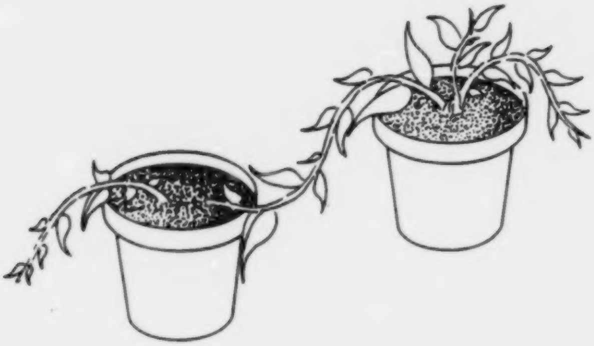


Leaf Cutting

- **layering** – removing leaves from one stem of a spreading plant and, without cutting the stem, burying the bare section in another container until the stem takes root and forms a new plant

  EXAMPLES: Blackberries, azaleas

LAYERING



HORTICULTURE IN OKLAHOMA

In 1987, 41,093 acres were used for commercial vegetable production in Oklahoma, valued at $36 million. In addition, 55 percent of all households in Oklahoma had vegetable gardens. The average Oklahoma home garden was 65 square feet and produced $539 worth of vegetables. That comes to $26.9 million for the state.

Oklahoma has ranked fourth nationwide in pecan production for about 20 years, growing more than 100 million pounds of pecans annually.

Each year 400,000 bushels of peaches are grown in Oklahoma, making it about 20th nationwide in peach production.

Oklahoma is ranked 16th in nursery production. Two of the largest nurseries in the nation are located in Tahlequah. The nursery industry in Oklahoma brings in $66 million annually -- 50 percent of which comes from out-of-state.

Oklahoma houses 3.5 million square feet of greenhouses and outdoor floriculture area, producing over $30 million dollars worth of flowers each year.

Turfgrass, one of horticulture's fastest growing industries, produces an income of over $60 million dollars in maintenance alone. Additional millions are spent on sod farming and installation.

These figures represent over $200 million dollars in annual income, and they don't include golf course design and maintenance, landscape architecture, retail floral sales, research, fruits other than peaches, or many other branches of horticulture. They do, however, prove the importance of the horticultural industry.

PLANTS AND PRISONS

When you think of prisons, you probably don't think of lush green lawns, carefully trimmed hedges, and bright, colorful flowers. But that is what you will find today at Conners Correctional Center in Hominy, Oklahoma.

In the past, prison yards were unlandscaped. Paths were not defined and soil was exposed. On windy days, the yard was full of dust.

Then an Oklahoma State University horticulture student suggested that prison officials landscape the "common," the central part of the yard used by all prison inmates. She studied traffic patterns, drew scale drawings, and suggested plant varieties. Prison officials made some changes. Trees were removed from the plans because they would block the guards' vision. Hedges had to be small, for the same reason. With a little work, a landscape plan meeting prison needs was developed and the drab prison area was replaced with an attractive, usable yard.

After the common area was landscaped, each prison unit set up a committee of staff and inmate representatives who designed a scale drawing and landscape plan for their unit area. The unit areas were landscaped and are maintained by the inmates.

An area vocational-technical school began offering horticulture classes to inmates. The inmate-students are responsible for maintaining the common area.

Has the program had any effect on the prison? Linda LaZelle, Unit Superintendent and Landscape Program Coordinator explains, "It calms everyone...makes them proud of where they live. It's a self-esteem building thing. Before, it was like a slum environment, you know, the old stereotype. Now it's a showplace." She explains that the horticulture classes are always full. "We're a medium security prison. Before prisoners are released, they're transferred to a minimum security prison and usually they'll request Jess Dunn [Correction Center in Taft, Oklahoma]. They have turf management classes there. Then they (inmates) know they can get a good job somewhere if they've taken both classes."

Helping inmates find good jobs is important. Ms. LaZelle thinks the program helps keep people from going back to prison. She explains "I don't have any figures and I suppose inmates could have been re-arrested and sent to another facility, but I've been here ten years, and I've never seen a [horticulture] student come back to prison."

LANDSCAPING GUIDELINES

Landscaping can be a very demanding job. There are so many things to consider before choosing plants. As you try landscaping, keep these things in mind:

- Landscaping must serve the needs of the people who will use the area. Maintenance, pathways, privacy, and cost must meet individual tastes and needs.

- Practical needs must be met. Garbage storage and collection sites, driveways, shipping and receiving docks, and other areas must remain usable and accessible.

- Aside from the view from the outside, the view from the inside must be considered. How will the arrangement look as viewed through each window?

- The direction the structure faces must be considered from the very beginning. North-facing structures, for example, will be hit by cold winter winds and get less sunlight. South-facing structures will receive the brunt of the summer sun.

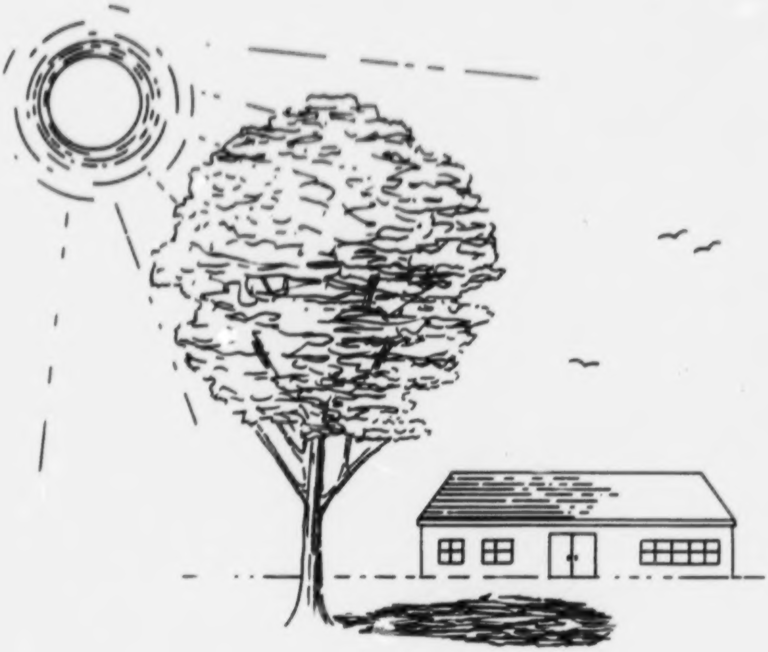
- The terrain, that is the slope of the area around the structure, is also important. If the structure is surrounded by higher ground, for example, it may have wind or drainage problems.

- The location of underground utilities such as electric or telephone cables, buried pipes, or sewers may limit the choice of trees and plants.

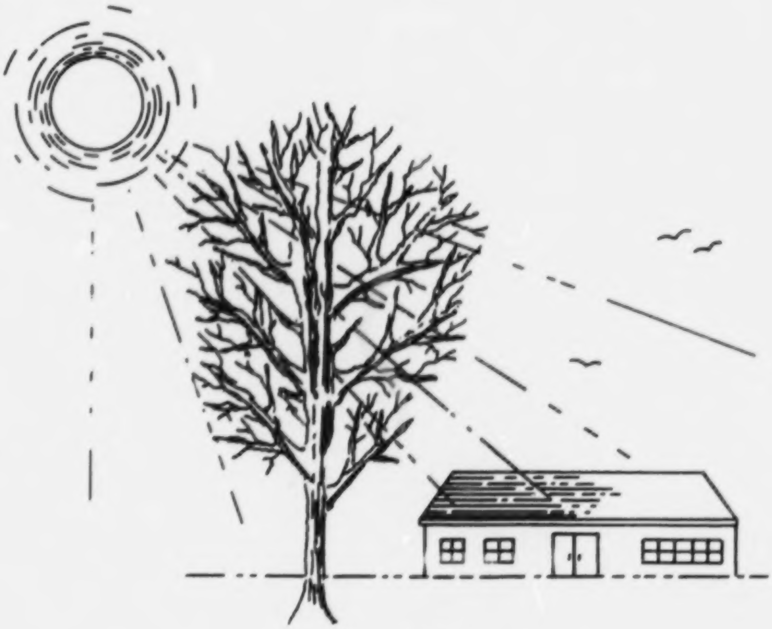
- Architects consider the angle of the sun throughout the day and the latitude of the structure to determine how high trees can be and how far away from the structure they can be and still provide summer shade without blocking winter sunlight.

- The seasons affect plants. The effects can be used to the landscapers' advantage. For example, a deciduous tree planted near a house can block summer sun from heating a house, then permit sunlight to warm the home in winter.

SUMMER



WINTER



- Plants and trees can block wind and insulate structures.
- Landscaping should not block the vision of people driving past the property, especially on corners.
- Flowering plants should be chosen with their blooming times in mind. Ideally, a variety of flowers will be chosen and at least one species will be in bloom through the growing season.

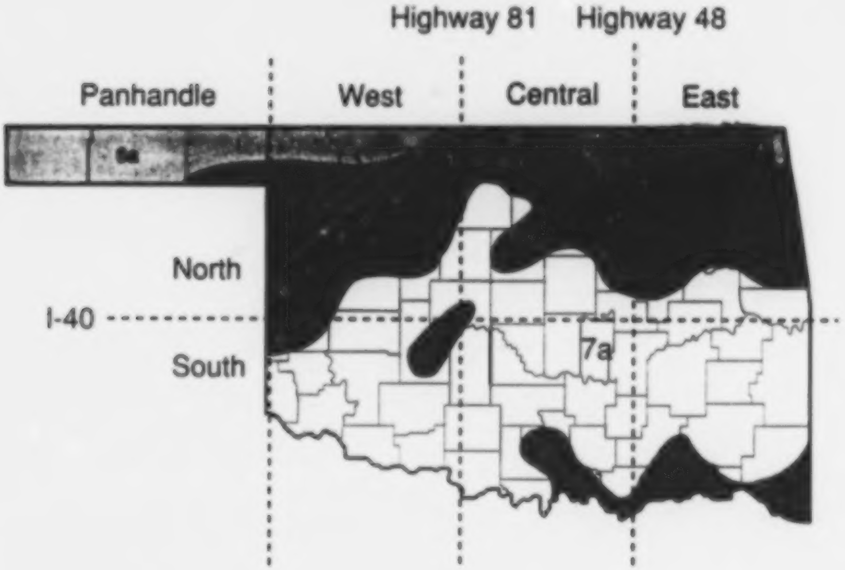
STEPS IN PLANNING

1. Anyone who is thinking about adding to or changing the landscape of their home or business needs to begin by putting their thoughts on paper. Drawings should be made on graph paper so they will be to scale. A good rule of thumb is to let each square equal one square foot. Measurements of the lot and the buildings need to be drawn out first. Details of the buildings, such as doors, windows, and walkways need to be included. Next, the existing landscaping should be added to the drawing. Be sure to include all trees and shrubs, lighting conditions, and views (both good and bad ones). Also note any problems you would like to solve or any problem areas that exist. This drawing will act as a map for your landscaping project.

2. Lay a piece of tracing paper over your drawing and determine possible uses for the areas you would like to improve. A sunny area might be used for a flower or vegetable garden, or an open spot might be a play area or nice place for a picnic table and chairs. Sketch out rough ideas. You can make more than one rough sketch and then decide which one best meets your desired plan.

3. When you have decided what you want in each new area, draw more detailed designs using the tracing method you used before. Use your original map as the base for the drawings. Sketch in all trees and shrubs, be sure to note which ones will be used to help block bad views, etc. and which will be used for shade or appearance. Don't forget the garden and open/play areas. Add any paving, terraces, breezeways, and additional buildings you plan to add. The end result will be a well-planned, detailed drawing of your landscaping plans.

PLANT HARDINESS ZONE MAP

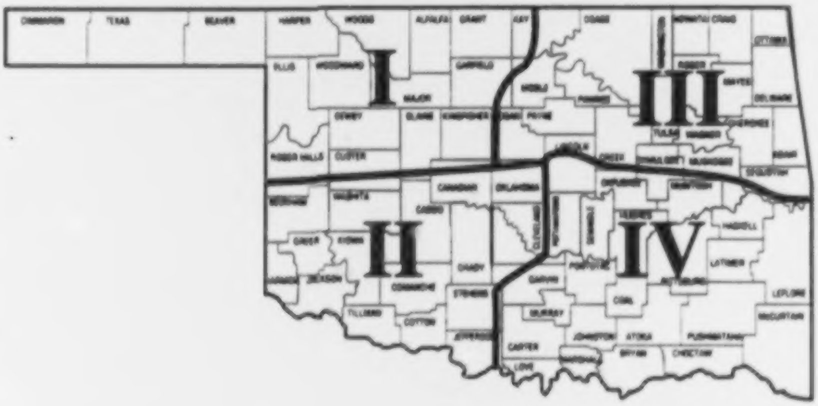


The USDA has recognized eleven climatic zones reaching from the Arctic Circle (1) in the north to Key West Florida (10) and Puerto Rico (11) in the south. Zones 6 and 7 divide Oklahoma somewhat diagonally. Starting from Zone 1 and moving southward, each zone is 10 degrees colder. IN the illustration above, the "a" or northern portion of Zone 6 is five degrees colder than the "b" portion or southern portion of Zone 6.

These zones are referred to in plant catalogs and other reference materials. If a plant has a rating of 5/7, this means that the plant can tolerate the cold winter weather of Zone 5 as well as the summer heat of a Zone 7.

Courtesy of USDA

CLIMATIC AREAS OF OKLAHOMA



Area	Region	Average Annual Precipitation	Mean January Temperatures
I	The Panhandle and N. W. Oklahoma	16" to 31" (from NW to SE)	32° to 40°F (increase North to South)
II	Southwestern Oklahoma	25" to 35" (from NW to SE)	36° to 43°F (increase North to South)
III	Northeastern Oklahoma	30" to 45" (from NW eastward with the highest precipitation in the Ozark Plateau)	35° to 40°F (increase North to South)
IV	Southeastern Oklahoma	34" to 56" (from NW to SE)	42° to 45°F

The borderlines in Areas of Oklahoma are by no means permanent! Along the borders of different areas, for any given year, the climate may be more like the climate across the line.

NOTE: Specific geological outcroppings such as the Wichita, Arbuckle, and Oachita mountains can have a localized effect on the weather of that area.

Courtesy of USDA

ACTIVITY SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, science, oral communication, interpersonal or relating, creative thinking/problem solving, employability, AND social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  WRITING SKILLS

  - Completing forms and records

  MATHEMATICS SKILLS

  - Making change
  - Solving income/expense problems

  ORAL COMMUNICATION SKILLS

  - Working effectively in a group

  INTERPERSONAL OR RELATING SKILLS

  - Participating in group activities

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Creating a finished product
  - Transferring knowledge/training to new situations
  - Developing an action plan

- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty completing forms and records:
  - Examine the structure of the forms being used.
  - Stress the importance of accurate, legible records.
- If students have difficulty making change:
  - Demonstrate the correct way to make change.
  - Suggest they practice counting change correctly.
- If students have difficulty solving income/expense problems:
  - Review basic principles of income and expense management.
  - Take them through the steps of estimating cost.
  - Demonstrate how to select and calculate their profit margin.
- If students have difficulty working or participating effectively in a group:
  - Stress the importance of taking a part in the discussion and stating ideas.
  - Remind them to listen respectfully to the ideas and opinions of others.
  - Stress the importance of having a positive attitude.
  - Ask them to work constructively to set and achieve the goals of the group.
- If students have difficulty creating a finished product:
  - Review the analysis and synthesis of information to determine whether the conclusions are correct.
  - Review the action plan to determine whether it will bring the desired results.

  - Discuss the way in which the finished product is organized.

- If students have difficulty transferring knowledge/training to new situations:
  - Review the pertinent training. Compare the new situation to the training situation.
  - Examine ways in which training can be used in the new situation.

- If students have difficulty developing an action plan:
  - Instruct them to identify the issues involved.
  - Discuss the goals of the action plan.
  - Review the information.

ACTIVITY SHEET | **HORTICULTURE** **V**

Name ______________________________ Score ____________

INTRODUCTION

Conduct a fund-raiser

Grow plants or order flowers and arrange them attractively. Then sell them as a class project. Decide how you will use the profits. You will need the following supplies:

- Flats
- Growing medium
- Seeds, 2" pots, and labels or plants for division
- Ribbons, florist's tape, and other floral design items
- Fertilizer
- Poster board and markers

1. Plan your sale. Choose a plant and decide how it will be grown. You might want to look ahead to upcoming events such as dances, Christmas, Mother's Day, etc. Schedule enough time to raise the plants for sale just before the event. Decide what the profits will be spent on.
2. Choose a committee to publicize the sale. They should set up an attractive table, make posters, and announce the sale in your school newspaper.
3. Assign plant maintenance duties. Keep a log of watering and fertilizing. Repot the plants, as needed.
4. Purchase ribbons, florist's tape, and other supplies. Invite a florist to help you arrange the plants or flowers.
5. Price each item according to its cost and profit margin.
6. Assign sales duties.

Functional Reading Skills
- Follow written instructions

Functional Writing Skills
- Complete forms & records

Functional Math Skills
- Make change
- Solve income/expense problems

Interactive Communication Skills
- Work effectively in a group

General Relating Skills
- Participate in group activities

Cognitive Activities Skills

- Create a finished product
- Transfer knowledge/ training to new situations
- Develop an action plan

JOB SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Using standard references
  - Using in-book reference tools
  - Following written instructions
  - Interpreting graphics and symbols

  WRITING SKILLS

  - Constructing graphics and symbols

  MATHEMATICS SKILLS

  - Using English and metric measures
  - Applying techniques of scaling
  - Interpreting plans and blueprints
  - Making measurements

  SCIENCE SKILLS

  - Using scientific instruments (ruler)
  - Investigating issues of environmental impact

EMPLOYMENT SKILLS

- Practicing good work habits/attitudes

- If students have difficulty in using standard references and in-book references:
  - Locate and explain the purpose of the reference section of the library.
  - Discuss the fact that each standard reference provides a specific type of information.
  - Discuss what kind of information the students need to find.
  - Review the use of in-book reference tools
  - Discuss the importance of being able to use standard references.
- If students have difficulty interpreting and constructing graphics and symbols:
  - Review the structure of the plans and the accompanying symbols.
  - Suggest they look at several landscaping plans and identify the elements.
- If students have difficulty using English and metric measures or making measurements:
  - Review units of measure in the English and metric systems.
  - Determine which system is used on the available instrument and demonstrate its use.
- If students have difficulty applying techniques of scaling:
  - Review the relationships in the specific drawing.
  - Demonstrate, using graph paper if necessary, the techniques of scaling.
- If students have difficulty using scientific instruments (ruler), review the correct procedure for its use.

- If students have difficulty developing good work habits/attitudes:

  - Encourage them to become familiar with the entire procedure before they begin the work.

  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.

  - Discuss what behaviors and attitudes constitute good work habits.

  - Make sure the student knows what is expected of him or her.

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

JOB SHEET 1

HORTICULTURE

V

OBJECTIVE 5

Plan a landscape scale drawing for your schoolyard.

INTRODUCTION

Landscaping can add to the aesthetics of any building–even your schoolyard. Use the following job sheet to design a new "look" for your schoolyard. Use Student Supplement 4 to assist you with this project.

EQUIPMENT AND SUPPLIES

- Basic scale drawing of your school building
- Pencil and eraser
- Ruler
- Dictionary of plants
- Tracing paper
- Paper

PROCEDURE

1. Your instructor will give you a drawing of your schoolyard. Place the first sheet of tracing paper over the scale drawing. Mark the following areas:
    - Traffic paths
    - Plants or structures already in place
    - Sloped areas
    - Fences and sidewalks
    - Areas where soil is exposed or poor quality
    - Areas where water pools when it rains
    - Areas where people gather
2. On a separate sheet of paper list all the uses for the schoolyard and choose areas that would be best for each activity. Replace the tracing paper and mark these areas on the second sheet of tracing paper.
3. Lay both pieces of tracing paper over the scale drawing. Look at how existing conditions (marked in Step 1) and possible uses (marked in Step 2) relate to each other. Do existing conditions help or do they cause problems?
4. Choose three areas that need to be changed. Mark them on the piece of tracing paper with existing conditions. Write what the problem is next to the circle.
5. Lay a third piece of tracing paper over the scale drawing. You might want to leave the other layers in place, or you might want to work with only the basic schoolyard drawing.

Research and Reference Skills

- Use standard references
- Use in-book reference tools

Functional Reading Skills

- Follow written instructions
- Interpret graphics & symbols

Composition Skills

- Construct graphics & symbols

Math Application Skills
- Use English & metric measures
- Apply techniques of scaling

Data Analysis and Display Skills
- Interpret plans/blueprints

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments (ruler)

Earth Science Skills
- Investigate issues of environmental impact

Job Acquisition/ Development Skills
- Practice good work habits/attitudes

6. Draw your ideas about how the schoolyard could be landscaped to solve the problems you chose. Think about paths, walls, fences, plants, grasses, or other things that could be added. Consider these things when as you make your plans:

    - Trees and plants can block wind, noise, and heat.
    - Trees or large plants should not be too close to buildings. Roots can damage foundations.
    - Remember that different plants need different amounts of water and sunlight. Use your plant dictionary to choose appropriate plants.
    - Consider the needs of the school from your principal's point of view. Are the plants hard to maintain? Expensive? Do they block the view needed to supervise students?

7. Copy your final plan on the scale drawing your instructor gave you. Label the plants with their names and the plant dictionary page numbers.

8. Have your instructor check your work.

9. Put tools away and clean your work area.

JOB SHEET 2

Development of:
READING SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, science, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  SCIENCE SKILLS

  - Investigating/applying principles of anatomy/physiology

  EMPLOYABILITY SKILLS

  - Mastering a specific job task/procedure
  - Practicing good work habits/attitudes

- If students have difficulty investigating/applying principles of anatomy/physiology:
  - Review the characteristics of each type of plant.
  - Discuss the growth pattern of each type as it relates to the regeneration methods.
- If students have difficulty mastering a specific job task/procedure:
  - Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.
  - Suggest they study each component of the procedure to determine which area is causing difficulty.
  - Review the entire procedure.

  - Team them with proficient students or professionals to practice the procedure.

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

JOB SHEET 2 HORTICULTURE V

OBJECTIVE 6

Grow plants using various regeneration methods.

INTRODUCTION

Objective 4 described different methods of plant regeneration. This job sheet will let you grow plants using the various regeneration methods discussed.

EQUIPMENT AND SUPPLIES

- Large bucket washed in hot water and bleach
- Potting soil
- Peat moss
- Perlite
- Vermiculite
- Lime
- Gardening trowel
- 10-12 clay or plastic pots washed in hot water and bleach
- Scissors
- Plastic bags and ties
- Starting fertilizer
- Seeds
- A perennial with a large, tangled clump of roots
- Spade
- Knife
- Gardening fork
- Healthy potted plant with trailing stems
- Flats

PROCEDURE

Functional Reading Skills
- Follow written instructions

Prepare growing medium.

1. Mix one part potting soil, one part peat moss, one part perlite and one part vermiculite in a large bucket. Use a gardening trowel to stir it until it is thoroughly mixed.
2. Store growing medium in tightly sealed plastic bags.
3. Sterilize each pot and flat.

PROCEDURE

Life Science Skills
- Investigate/apply principles of anatomy/physiology

Plant seeds.

1. Follow directions on the seed packet about depth to plant seeds, sunlight needed to germinate, if covering the seedlings will speed germination, and best temperature range.

2. Plant the seeds in flats, using the growing medium you mixed.

3. As the seeds grow, you will need to thin the plants. Thin as instructed on the seed packet.

PROCEDURE

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

Transplant seedlings.

1. When the seedlings grow their second set of true leaves, they should be transplanted. First prepare pots by sterilizing them and filling them with growing medium.

2. Water the growing medium.

3. Use a dibble (tool that makes a small depression to hold the seed), finger, or pencil to make a hole in the center of the pot.

4. Loosen the growing medium in the flat around the seedling you are going to transplant. Be very careful not to damage the seedling or roots.

5. Hold the seedling by a pair of leaves, not the stem, and carefully remove it from the flat.

   NOTE: Holding the stem may damage it.

6. Place the entire root system in the hole you made in the pot's growing medium. You may need to make it a little bigger.

7. Firm the soil around the seedling, again being careful not to damage the plant.

8. Water the transplant lightly with water and fertilizer.

PROCEDURE

Divide a plant.

1. Dig up a perennial, trying not to damage the roots. If necessary, trim the foliage to make removal easier. The plant should be at least three inches high after it is trimmed.

2. Divide the clump of roots into small bunches. Each bunch should have at least five "eyes" or growing points. You can divide them with your hands, scissors, or a gardening fork.

3. Put each bunch in a pot. Fill the pot with growing medium and water it.

PROCEDURE **Use cuttings to grow a plant.**

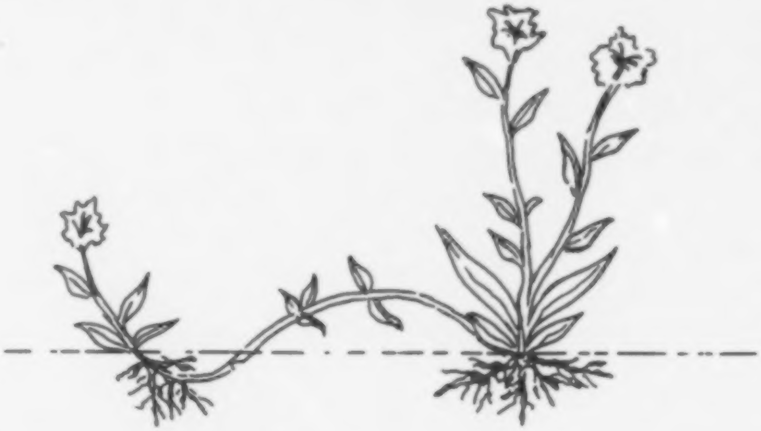
1. Choose a healthy stem of a potted plant. Cut the stem between three and six inches from the tip. Be sure the piece you cut includes at least three nodes (the places on stems where leaves grow).

   NOTE: For best results, cut just below a node.

2. Remove leaves from the clipped end of the cutting, leaving a bare stem 1-2 inches long. Leaves at the other end should be left in place and not damaged.
3. Dip the cutting in starting fertilizer.
4. Carefully place the cutting in a pot filled with growing medium.
5. Moisten the medium.
6. Put the pot in a plastic bag and seal it.
7. Leave the pot in the plastic bag for about two weeks, when the cutting should be rooted.

PROCEDURE **Start a plant by layering.**

1. Choose a healthy stem on a potted plant.
2. Fill a second pot with growing medium.
3. Remove leaves from a section of the potted plant stem you selected. The bare area should be about four inches long. Leaves should be left on either side of the bare area.



4. Bury the bare area in the second pot.
5. Moisten the growing medium.
6. In about three weeks, cut the stem between the two pots.
7. Have your instructor check your work.
8. Put tools and materials away and clean work area.

PRACTICAL TEST 1

HORTICULTURE

V

JOB SHEET 1

Plan a landscape scale drawing for your schoolyard.

Student's name ____________________ Date ____________

Evaluator's name ____________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Marked existing conditions on the first sheet of tracing paper	___	___
2. Listed all the uses for the schoolyard and chose areas that would be best for each activity on a separate sheet of paper. Marked areas on the second sheet of tracing paper	___	___
3. Compared existing conditions to possible uses	___	___
4. Chose three areas that needed to be changed and marked them on the first piece of tracing paper	___	___
5. Drew ideas about how the schoolyard could be landscaped to solve the problems on a third sheet of tracing paper	___	___
6. Transferred plans to original scale drawing, labeled plants	___	___

7. Put tools away and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Identified existing conditions	4	3	2	1
Identified use areas	4	3	2	1
Identified problem areas	4	3	2	1
Suggested landscape solutions and plants	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 2

HORTICULTURE

V

JOB SHEET 2

Grow plants using various regeneration methods.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
Prepare growing medium		
1. Mixed growing medium	___	___
2. Stored growing medium properly	___	___
3. Sterilized pots and flats	___	___
Plant seeds		
1. Followed directions for planting seeds	___	___
2. Planted the seeds in flats	___	___
3. Thinned seedlings	___	___
Transplant seedlings		
1. Prepared pots	___	___
2. Watered growing medium	___	___
3. Made a hole in the center of the pot	___	___

4. Loosened growing medium in flat ____ ____
5. Held the seedling by leaves, and removed it from the flat ____ ____
6. Placed root system in the hole ____ ____
7. Firmed soil around the seedling ____ ____
8. Watered and fertilized the transplant ____ ____

Divide a plant

1. Dug up a perennial ____ ____
2. Divided the clump of roots into small bunches with at least five growing points each ____ ____
3. Put each bunch in a pot, filled it with growing medium and watered it ____ ____

Use cuttings to grow a plant

1. Cut three to six inches off the tip of a healthy stem ____ ____
2. Removed leaves from the clipped end of the cutting ____ ____
3. Dipped the cutting in starting fertilizer ____ ____
4. Placed the cutting in a pot filled with growing medium ____ ____
5. Moistened the medium ____ ____
6. Put the pot in a plastic bag and sealed it ____ ____
7. Left the pot in the plastic bag for about two weeks ____ ____

Start a plant by layering

1. Chose a healthy stem on a potted plant ____ ____
2. Filled a pot with growing medium ____ ____

3. Removed leaves from a section of the stem ___ ___
4. Buried the bare area in the second pot. ___ ___
5. Moistened the growing medium. ___ ___
6. About three weeks later, cut the stem between the two pots. ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Mixed growing medium	4	3	2	1
Sterilized pots and flats	4	3	2	1
Planted seeds	4	3	2	1
Transplanted seedlings	4	3	2	1
Divided a plant	4	3	2	1
Regenerated a plant by cutting	4	3	2	1
Regenerated a plant by layering	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

HORTICULTURE

V

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with horticulture to their definitions. Write the correct letter in the blank.

Part I

_____ 1. The part of an arrangement that stands out or attracts attention

_____ 2. A mix of organic and inorganic matter that plants are generated and grown in

_____ 3. A plant's ability to withstand stress

_____ 4. Arranging flowers and greenery attractively in pots, window boxes, flower beds, corsages, bouquets, etc.

_____ 5. Beauty and art in all forms

_____ 6. Binding a shoot or bud of one plant to a stem or trunk of another in a way that allows them to grow together

_____ 7. The amount of sunshine that regularly falls on a location

_____ 8. Plants that have been genetically designed to be smaller than normal plants of the same type

a. aesthetics

b. attractiveness

c. binding

d. diameter

e. dwarf plants

f. exposure

g. floral design

h. focal point

i. grafting

j. growing medium

k. hardiness

May be photocopied for student use.

Part II

_____ 1. The agricultural science that studies fruits and vegetables, flowers, nuts, greenhouse plants, and ornamental plants

_____ 2. Growing a new plant

_____ 3. The arrangement of plants, flowers, etc., inside homes or buildings

_____ 4. The arrangement of plants, flowers, fences, paths, and other ornaments and structures outside homes or buildings

_____ 5. The main root of some types of plants

_____ 6. A business that produces, harvests, and sells ornamental trees and shrubs

_____ 7. The width of a mature plant

a. horticulture
b. interiorscapes
c. landscaping
d. light level
e. miniatures
f. nursery
g. primary root
h. regeneration
i. spread
j. strength
k. taproot

OBJECTIVE 2

Select from a list true statements about the effect of plants on people. Write an "X" in the blank before each true statement.

_____ 1. Research indicates that exposure to plants lowers blood pressure.

_____ 2. Plants are in grocery stores, offices, and other places only because they are fashionable.

_____ 3. Being around plants can relax your muscles and slow your heart rate.

_____ 4. Research shows that people who tend gardens are more resistant to stress and heart attacks.

_____ 5. Being around plants makes you stronger.

May be photocopied for student use.

_____ 6. Doctors have not yet applied research about the effects of plants on people.

_____ 7. Hospitals are putting more plants in their patient areas.

_____ 8. People have only begun using plants to beautify their homes in the last hundred years.

_____ 9. Aesthetics satisfy an instinctive desire.

_____ 10. The desire for beauty goes hand-in-hand with technological advances.

OBJECTIVE 3

Choose the word or phrase that completes statements about careers in horticulture. Write the correct letter in the blank.

_____ 1. Cities nationwide are enacting landscaping ordinances outlining

a. the amount of space that must be left green and landscaped on construction sites and around existing buildings
b. the amount of money each homeowner must spend on landscaping
c. minimum education requirements for landscape architects
d. which plants may or may not be used in landscaping

_____ 2. Many experts rate horticulture as

a. a moderately-growing field
b. one of the fastest-growing job markets in America
c. a slow-growing job market
d. a field that might grow, but is difficult to predict

_____ 3. Higher paying horticulture jobs require some training, such as

a. on-the-job experience
b. vocational-technical or college education
c. high school agriculture classes
d. 2 and 3 day training seminars

May be photocopied for student use

____ 4. Horticulture students should have a good background in

a. math, algebra, biology, and chemistry.
b. biology and physics
c. math, algebra, history, and physics
d. history, physics, math, and biology

____ 5. Art instruction is important in

a. all phases of horticulture
b. no horticulture field
c. flower-related horticulture fields
d. landscape architecture, floral arrangement, and similar fields

____ 6. Since many horticulture jobs require giving instructions or updating information, it is important to have good skills in writing and

a. economics
b. drawing
c. public speaking
d. be in good physical condition

OBJECTIVE 4 **Describe methods of regeneration.** Write a short paragraph on each method of regeneration.

1. Seeds and seedlings: ____________________

____

____

____

2. Division: ____________________

____

____

____

May be photocopied for student use

3. Cuttings: ____________________

____

____

____

4. Layering: ____________________

____

____

____

____

NOTE: Objectives 5 and 6 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

HORTICULTURE

V

OBJECTIVE 1

Part I

1.	h	6.	i
2.	j	7.	f
3.	k	8.	e
4.	g		
5.	a		

Part II

1.	a	6.	f
2.	h	7.	i
3.	b		
4.	c		
5.	k		

OBJECTIVE 2

1, 3, 4, 7, 9, 10

OBJECTIVE 3

1.	a	6.	c
2.	b		
3.	b		
4.	a		
5.	d		

OBJECTIVE 4

Answers should include the following. You may add other facts presented during class lectures and assignments to required answer information.

1. Cultivating the seeds of a plant
2. Separating a plant and root system into two or parts and planting them separately
3. Removing a part of a plant and allowing it to root, forming a new plant
4. Removing leaves from one stem of a spreading plant and, without cutting the stem, burying the bare section in another container until the stem takes root and forms a new plant

OBJECTIVE SHEET

FORESTRY VI

INTRODUCTION

For centuries man has relied on the forests for shelter, food, materials, and transportation. Huts built of sticks and logs were covered with leaves or wood planks. Fires fueled with wood lit and warmed us in caves as well as in great palaces. Sticks were used for plows and weapons. Fruits and nuts provided food for man and attracted rabbits, deer, and other game. The forests provided wood for carts, wagons, birch-bark canoes, ships, and sleds.

People learned to make paper, chemicals, medicines, and products like pencils, tape, and plastics from wood. Now these are so important to our lives that we can't imagine living without them.

But forests have been endangered by man's lack of concern. In the 1800's and early 1900's huge forests were cut down to make room for farming, trains, and westward expansion. Today, acid rain, pollution, and third-world farming practices threaten Earth's forests.

We have begun to understand the importance of forests in the Earth's ecosystem only recently. Trees clean our air, cool the planet, prevent soil erosion, and provide us with foods, lumber, and other products. Tree farming and forestry have become major industries as people have become concerned about the future of our forests.

UNIT OBJECTIVE

After completing this unit the student will be able to identify basic types of trees and forests, wood processing and products. The student will also know how trees grow and why they are important. The student will demonstrate these competencies by completing job sheets, practical tests and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with forestry to their definitions.
2. List benefits of trees.
3. Choose the word or phrase that completes statements about hardwoods and softwoods.
4. Distinguish among types of forests.

5. Select from a list forestry skills.
6. Describe the steps in processing raw timber.
7. State examples of the variety of forest products.
8. Compare sawing hard and soft wood. (Job Sheet 1)
9. Make an identification table of local trees. (Job Sheet 2)
10. Recycle paper. (Job Sheet 3)

PREPARATION

- Order materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study the specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Obtain a section of a tree trunk for use with the Activity Sheet. A large section with clear rings will work best.
- Obtain or construct a flower press to be used in Job Sheet 2.
- Invite a tree farmer, tree doctor, forester, or wood processor to share their knowledge of trees with the class.
- Host a debate between a conservationist and an industrial tree farmer.

  NOTE: Supply guest speakers with the Objective Sheet, Information Sheet and any other components you want them to cover.

- Arrange a field trip to a forested area with a forester as a tour guide.
- Field trips to support this unit might include visits to a sawmill, a lumber yard, a paper mill, or a recycling plant.
- Allow one to two weeks for sample collection for Job Sheet 2.
- Find and display samples of different types of woods and wood products. Display posters about forests and forestry.

- Have the class perform one of these service projects:

  — Collect used newsprint and paper and take it to a recycling center. Locate a buyer or recycling center that will accept your paper before collecting it.

  — Make a map of a local park identifying the species of each tree. Consider adding a cassette recording that describes the height of the tree, it's possible age, and the habitats it houses. Make the map and cassette available to the public.

  — Plant seedlings on your school grounds or on the grounds of a local nursing home.

  — Host a tree party for a kindergarten class, Cub Scout Den, Brownie Troop, or 4-H Chapter. Serve nuts and apples, read *The Giving Tree* by Shel Silverstein, and tell the story of Johnny Appleseed. Give the group a seedling and help them plant it or give them the tree identification chart made in Job Sheet 2.

- Make arrangements for any audiovisual equipment that will be needed for this unit.

- Arrange to have all materials and supplies necessary to complete job sheets.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with forestry to their definitions.

- Add to the list terms introduced by guest speakers or during classroom activities.

- Add the names of trees common to your area. Add at least two different trees and be sure the definitions state differences between them.

Objective 2: List benefits of trees.

- Have students measure the outside temperature near trees, in an open, grassy space, and in a heavily-cemented area and compare readings.

- Have students collect pictures from magazines that do and do not include trees. Have the students separate the collection into two stacks: "I'd like to be there" and "I don't want to be there." Have them determine which stack includes more pictures of trees and discuss why.

- Have students list symbols and phrases that refer to trees. Some examples are: family tree, lovers carving their initials in the trunks of trees, and the Tree of Knowledge. Have them discuss why trees are appropriate for these symbols. Try to encourage abstract responses such as "a family has stability and roots, like a tree."
- Have students collect newspaper articles about environmental problems. Discuss the role of trees in environmental solutions.

Objective 3: Choose the word or phrase that completes statements about hardwoods and softwoods.

- Invite a woodcarver to discuss the difference between carving hardwoods and softwoods. Allow students to feel the difference by whittling each.
- Have students discuss how the choice of hard or softwood affects the quality of furniture.
- Have students compare how hardwoods and softwoods burn.
- Use Student Supplement 1 to discuss how trees grow.
- Have students complete Job sheets 1 and 2.
- Have a county extension agent or wood-burning stove salesperson discuss the different woods and how they burn. Use the Oklahoma State University Cooperative Extension Service "Heating with Wood Stove" series for additional information.

Objective 4: Distinguish among types of forests.

- Have students find magazine illustrations of each type of forest.
- Have students think of forests they know of and identify the type of each one. For example, the African jungle is a rain forest, and Yosemite is a coniferous forest. Include forests they may not have actually seen, such as Sherwood Forest or the Vietnamese jungles.

Objective 5: Select from a list forestry skills.

- During this discussion, stress the importance of forest planning and management and the variety of skills needed.
- Have students discuss current newspaper and television stories about forests and how forest management affects business and the environment.

- Visit a nearby tree farm, national forest, or commercial forest. Discuss how it is managed.

- Have students compare forest management to field crop production (Unit 7).

- Invite a forester to visit the class. Ask the forester to discuss his/her responsibilities, and how environmental, tourist, business, and modern technology concerns have affected forestry.

- Have students discuss what each of the following people would see as the main responsibility of a forester: an environmentalist, the owner of a commercial timber company, and an avid hiker.

- Have students hike through nearby stands of trees and identify evidence of forest management, such as harvested areas, fire breaks, or replanting.

- Use Student Supplement 1 to demonstrate how trees grow.

Objective 6: Describe the steps in processing raw timber.

- Have students visit a nearby sawmill.

- Have students visit a lumberyard. While there, ask students to discuss possible uses for various types of lumber.

- Have students identify pre-processing, processing, and post-processing steps.

- Have students complete Job Sheet 3.

Objective 7: State examples of the variety of forest products.

- Have students list all the lumber products they recognize and use in one 24-hour period.

- Take the class to the library and ask them to look up lists of products derived from wood or wood products.

- Invite a pharmacist to discuss the importance of the forest to medicine.

- Have students prepare and display posters on the importance of forest products in our daily lives. Another possible topic is the importance of preserving and protecting our forests.

- Tell students the first tools man used were made of wood. Though few of these have survived, anthropologists have shown that clubs, spears, arrows, and boomerangs were among the first weapons. Use this information to illustrate man's reliance on wood.

- The first vehicle used by man was also made of wood. It was a log floated down the river. Have students list other vehicles made from wood. Include modern vehicles such as sleds, skis, canoes, and skateboards.

- Take students to a local museum. Ask them to list articles on display that are made from forest products.

- Have students list future uses of wood products. Have them explain why wood would be used rather than other materials.

APPLICATION

Objective 8: Compare sawing hard and soft wood.

- Students may not know how to handle a saw. Have a variety of hand saws available. Explain the differences among them and their uses.

- Invite a retiree involved in woodworking to show students how to saw wood.

- Have students saw unidentified wood and determine if it is a soft or hard wood.

Objective 9: Make an identification table of local trees.

- Use a variety of resources. Student Supplement 2 will give basic information. Other good sources are Boy Scout publications and Audubon Society field books.

- Use wood products to complete the chart.

- Show students how to use a flower press to preserve flowers and leaves. If you are unfamiliar with flower presses, contact a local florist. If a flower press is not available, use a large catalog. Place specimens between sheets of brown Kraft paper or acid-free paper, place them in the catalog, and store the catalog flat on a shelf. Lay bricks or a cement-block on the catalog.

Objective 10: Recycle paper.

- Visit a paper mill.

- Have students list as many paper products as they can.

- Have students begin a paper recycling program in your school. Before beginning the project, locate a buyer or recycling agent.
- Consider using this project as a fund raiser. Recycle the paper and stamp it with holiday or school designs. Sell the paper and use the proceeds to buy seedlings for the school grounds.
- Use paper taken from school trash cans to complete the project.
- Paper ribbons and construction paper will scraps add color and design to the paper.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Bark is Best.* National Bark Producers Association, 13542 Union Village Circle, Clifton, VA 22024. Discusses the production, varieties, benefits, and applications of tree bark and related byproducts. Available for free loan. (10 minutes, color, VHS)

- *The Continuing Forest.* Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709. Covers the role of our National Forests and the USDA Forest Service. Available for free loan. (29 minutes, color, VHS or 16 mm film)

- *The Forest Industry.* Montana Women in Timber, 2225 Dillon Road, Columbia Falls, MT 59912. Covers industry processes from seeding to harvesting and processing, reforestation, specialty mills (lumber, plywood, fiberboard, and paper), products made from wood, and wood byproducts. (28 minutes, color, VHS with script)

- *1988 Yellowstone Fires.* Video Vision, PO Box 6721, Bozeman, Montana, 59715. Discusses the fires and their effect on the forest. Two formats are available, a 20 minute version and a 60 minute version.

- *Project Learning Tree.* Activity-based curricula available to you by attending a 6-hour workshop on incorporating environmental education in basic sources. For more information contact your local extension agent or State Forestry Division, (405) 521-3864.

- *Replanting the Tree of Life.* Bullfrog Films, Inc., Oley, PA, 19547, 800-543-3764. An inspiring film that explains the essential part trees play in our lives and in the life of the planet. Covers a wide range of information from how trees purify the air we breathe and process the water we depend on, to the central place trees and tree symbols have played throughout history in different cultures, including our own. Discusses how we depend heavily on trees for paper and building products and that countless jobs revolve around Earth's largest plants. The main purpose of this video is to heighten awareness of how important our forests are and to remind us not to waste this precious resource; to replant young trees when we harvest old ones; to learn by our mistakes so we don't repeat them in destroying our forests. Available to Oklahoma teachers on a free-loan basis from the Oklahoma Department of Vocational and Technical Education, Resource Center, 1500 W. Seventh Avenue, Stillwater, OK 74074. (20 minutes, color, VHS)

Print Media

- *American Forests.* Magazine. Includes a wide variety of forestry-related topics. Available from the American Forestry Association, P. O. Box 2000, Washington, DC 20077-4244.
- *Celebrate Arbor Day!* 23-page booklet. Includes information on Arbor Day celebrations students can sponsor or participate in. Available free from the National Arbor Day Foundation, 100 Arbor Avenue, Nebraska City, NE 68410.
- *Famous and Historic Trees.* 90-page booklet. Includes information about trees associated with American history. Available from the American Forestry Association, P. O. Box 2000, Washington, DC 20013.
- *Forest Products.* Poster. Includes information and games involving forest products and the Adirondack forests. Available from New York Agriculture in the Classroom, Cornell University, 111 Kennedy Hall, Ithaca, NY 14853.
- *Forests and Forestry in the U.S.A.* A book with information about forest history, forestry in America, urban forests, benefits of forest maintenance, and other current issues. Available from the American Forestry Association, P. O. Box 2000, Washington, DC 20013.
- *How a Tree Grows.* Poster. Illustrates the anatomy, enemies, life cycle, and functions of trees. Available from New York Agriculture in the Classroom, Cornell University, 111 Kennedy Hall, Ithaca, NY 14853.
- *National Forests Calendar.* Includes photos of trees and forest scenes. Revolves around a theme chosen each year. Available from Falcon Press, P. O. Box 1718, Helena, MT 59624.
- *So You Want to be in Forestry.* 16-page booklet. Covers the role of forestry, job opportunities, and how to prepare for and join the industry. Available from the American Forestry Association, P. O. Box 2000, Washington, DC 20013.
- *Trees Every Boy and Girl Should Know.* 88-page booklet. Includes photos of over 90 species native to America as well as information on the history and economic importance of the species. Available from the American Forestry Association, P. O. Box 2000, Washington, DC 20013.
- *Urban Forest Forum.* Monthly publication. Includes information on trees and forestry in urban settings. Available from the American Forestry Association, P. O. Box 2000, Washington, DC 20013.

- The Cooperative Extension Service and Agricultural Experiment Stations of Oklahoma State University, Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550. Offers a large selection of fact sheets. These fact sheets are also available from your local county extension agent.

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- *Early Protection and Care for Planted Seedlings.* Oklahoma State University: Stillwater, OK.
- *How We Learned to Grow Trees and More Than Trees (A Short Tree Farm History).* American Forest Council: Washington, DC.
- Marcouiller, David, and Steven Anderson. *Firewood: How to Obtain, Measure, Season and Burn.* Oklahoma State University: Stillwater, OK.
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- *Project Learning Tree.* The American Forest Institute, Inc.: Washington D.C., 1986.
- *Renewable Natural Resources/Agriculture Curriculum.* Alaska Department of Education, 1988.
- Shaddeau, C. Sue. *The South.* American Forest Council: Washington, DC.
- *Tree Farmers Growing 95 Billion Trees.* American Forest Council: Washington, DC.

- *Tree Seedling Availability, Planting, and Ir[illegible] Care.* Oklahoma State University: Stillwater, OK.

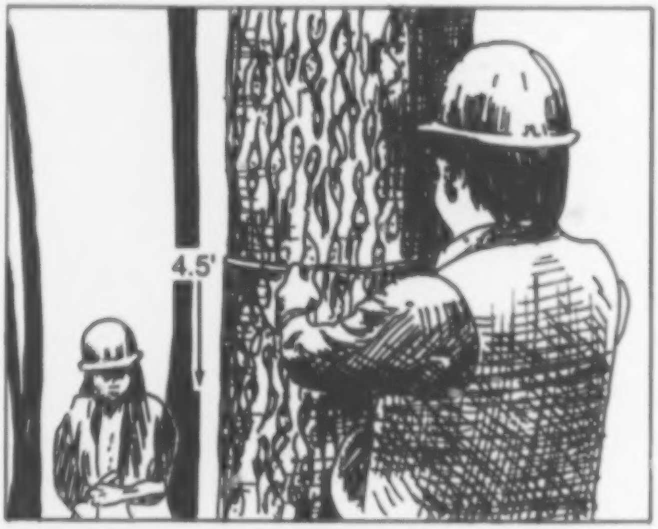
- Williams, Sandra Perky. *Forestry.* Curriculum and Instructional Materials Center, Oklahoma Department of Vocational-Technical Education: Stillwater, OK, 1991.

- Wittwer, Robert F., Dave Marcouiller, and Steven Anderson. *Even and Uneven-Aged Forest Management.* Oklahoma State University: Stillwater, OK.

OBJECTIVE 1 **Match terms associated with forestry to their definitions.**

- **canopy** – the uppermost branching layer of a forest
- **clear cutting** – a method of harvesting trees in which all or nearly all trees in an area are removed
- **cord** – the amount of cut wood in a stack 4 feet high, 4 feet wide, and 8 feet long
- **DBH (diameter breast height)** – 4.5 feet from the ground (1.3 meters), the standard place trees are measured.

  NOTE: The DBH is 4.5 feet in the U.S., but may be different heights in other countries.



- **even-aged** – a stand of trees that are all nearly the same age
- **fire break** – an area in a forest cleared of trees to prevent the spread of fire and give fire fighters an area to operate from
- **forest** – a large area of tree growth
- **habitat** – the environment where an animal or species of animals lives
- **nonporous** – contains few pockets of air or fluid

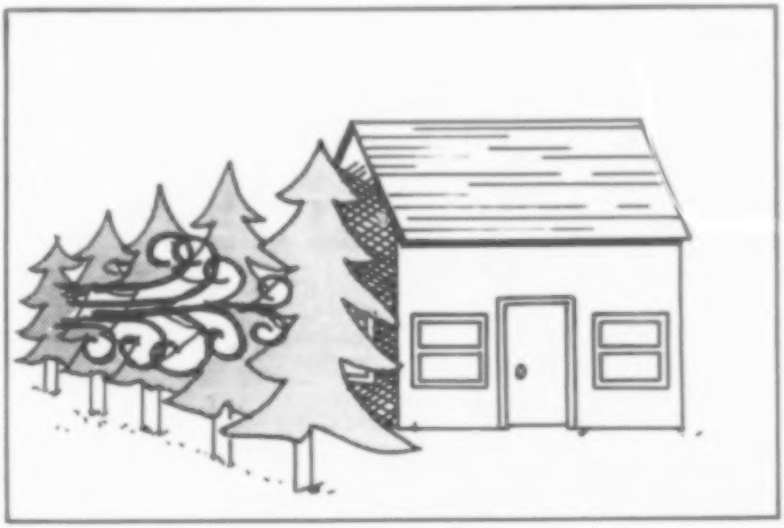
- **porous** – contains pockets that can be filled with air or fluid

  EXAMPLE: a sponge

- **rick** – a measurement of wood, usually half a cord

  NOTE: A rick is 4 feet high and 8 feet long, just like a cord. There is no standard for the width of a rick.

- **rotation** – the planned or actual time between planting and harvesting a crop of trees
- **seedlings** – young, small trees
- **silviculture** – the science of forest management
- **stand** – a group of trees
- **tree farm** – a farm on which trees are raised as a crop
- **uneven-aged** – a stand of trees with three or more different ages
- **windbreak** – a group of trees planted or arranged in a way that blocks the wind



OBJECTIVE 2 **List benefits of trees.**

- **Trees clean the air.** Irritants in the air, like dust, collect on leaves and twigs and are washed away by the rain. Trees have a respiration cycle like other plants (and like people). The leaves "breathe in" pollutants and other chemical wastes, and they "breathe out," or release, clean oxygen. In fact, in one year one acre of trees makes enough oxygen for 18 people and cleans as much carbon as a car would produce if it were driven 26,000 miles.

People must be catching on about how important trees are. The tree farming industry is growing faster than the U.S. highway system, the population, or the federal budget!

- **Trees cool the air.** Trees put moisture into the air and cool it. In urban areas, they shade buildings and pavement. Homes surrounded by trees may save 30 percent on cooling costs, and 20-50 percent on heating because the trees shade the house on hot days and block cold winter winds.
- **Trees reduce noise pollution.** They absorb and break up sound waves.
- **Trees increase property values.** Wooded property usually sells for more money than property without trees.
- **Trees prevent soil erosion.** Dead leaves covering the ground and the extensive root systems of trees help hold soil in place.
- **Trees attract and protect wildlife.** They provide food, shelter, and safety for insects, animals, and birds.
- **Trees provide privacy.** They add to the beauty of the neighborhood and they have a quieting and calming effect on people.
- **Trees provide a large number of products.** We use many products from trees daily and most are recyclable.
- **Trees are a renewable resource.** They can be grown almost anywhere.

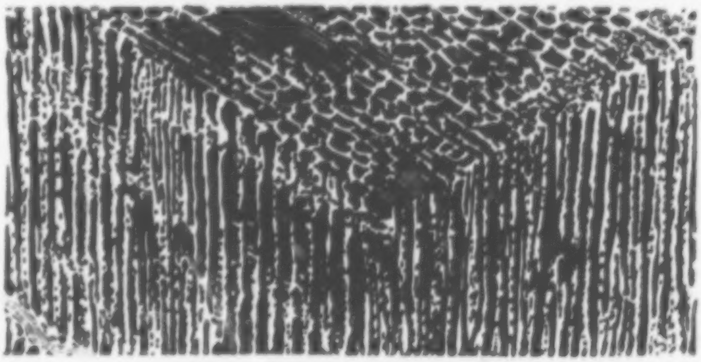
Going to the hospital soon? Studies prove that if your room has a nice view of trees, you'll recover and go home sooner.

OBJECTIVE 3

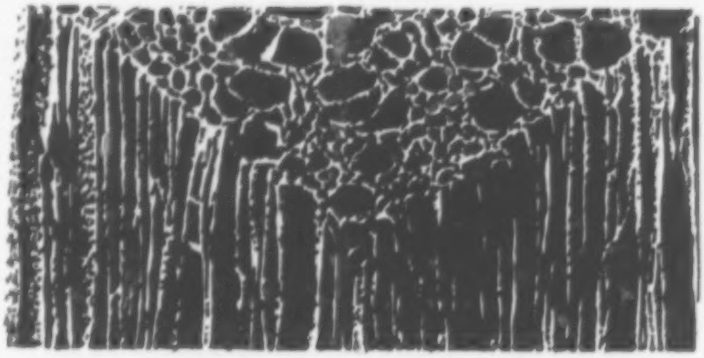
Choose the word or phrase that completes statements about hardwoods and softwoods.

Wood can be divided into two groups: hardwoods and softwoods. This doesn't mean that hardwoods are all hard and softwoods are all soft. The names come from the types of wood cells.

HARDWOOD



SOFTWOOD



Usually deciduous trees (trees that lose their leaves in the winter) are hardwoods and conifers (firs, pines, etc.) are softwoods but there are a few exceptions.

OBJECTIVE 4 **Distinguish among types of forests.**

There are three types of forests.

Tropical rain forests – Rain forests are the largest group, making up about half the world's forest area. These forests grow where there is high humidity and the temperature is usually warm, never below freezing. They may be 150 feet high and contain more than 80 tree species, with a high, dense canopy and thick undergrowth. Many rare flowers and plants used to make important medicines grow only in tropical rain forests, and many animal species are only found in them.

Tropical rain forests are found along the coasts and rivers of equatorial Africa and Australia, in South America around the Amazon and Orinoco Rivers, in Asian countries such as Burma, Thailand, Vietnam, and in other equatorial regions.

> The Amazon rain forests have made international headlines in recent years. They store pollutants and generate huge amounts of oxygen every day. Because the Amazon rain forests are so large, they can clean enough of the atmosphere to combat global warming.
>
> At the same time people began to understand how important the rain forests are, farmers and land developers were destroying the forest to put the land to a different use. The farmers are poor and must clear the land to grow enough food to survive, just as American pioneers cleared forest land.
>
> Many organizations are working with South American governments to educate and provide other economic support for the farmers, and save the rain forests.

Temperate hardwood forests – These are what most of us think of when we picture a forest: trees 75-100 feet high with a magnificent canopy in the summer and bare limbs in the winter. Hardwood forests account for about 15 percent of forest land today, but were much larger at one time. Many acres of hardwood forest have been cut to clear land for farming.

The largest temperate hardwood forests are found in Eastern and Central United States, Central Europe, and Asia. Other growth areas in the "temperate zones," include North, Central, and South America, Australia, Asia, and North Africa.

The United States contains about 737 million acres of woodland. 482 million acres are considered commercial, but only 260 million acres are productive and can support repeated crops. That comes to about one acre per person in America.

Coniferous forests – In colder areas, the coniferous forests thrive. Today, they are the main source of lumber and wood products. Coniferous forests are about 100 feet high and contain only a few species, such as pine and spruce. The canopy is high and is so thick that there is little undergrowth.

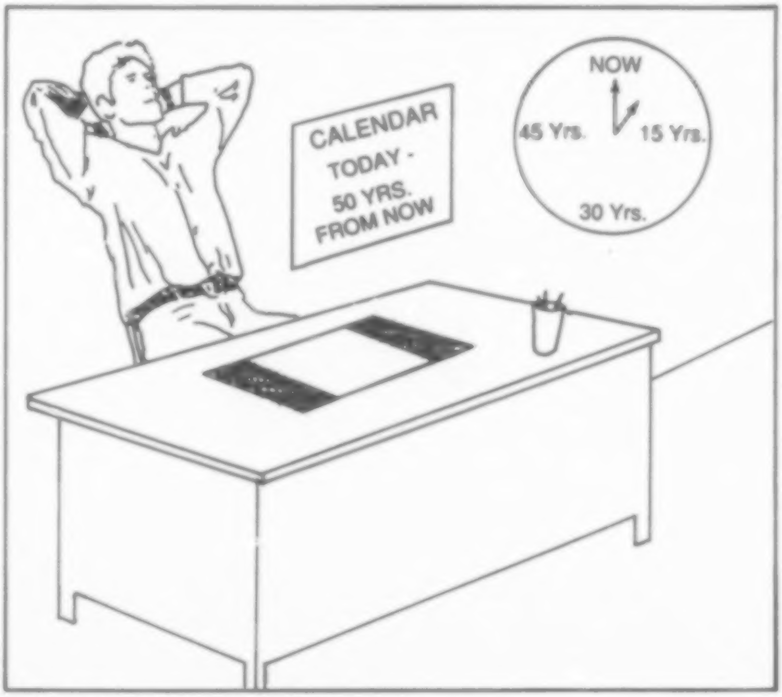
The coniferous forests thrive in the Northern Hemisphere, especially in the northwest United States, across Canada, northern Europe, and Asia.

Who owns the forest lands in the United States? Farmers own 58 percent, government owns 28 percent, and big industry owns only 14 percent of America's woodlands.

OBJECTIVE 5

Select from a list forestry skills.

It may seem like trees would be the easiest crop to grow: you plant them and then sit back for fifty years before you have to harvest anything. But that's not really how it works. It takes a lot of work to maintain a forest, even before harvesting.


CALENDAR
TODAY -
50 YRS.
FROM NOW
NOW
45 Yrs.
15 Yrs.
30 Yrs.

There are several considerations and skills involved in the forestry business.

- **Planning** doesn't stop when the tree is planted. Foresters and land owners must watch the forest and the land around it. They have to schedule thinning and harvesting in a way that will not harm the environment or endanger wildlife. The method of harvesting must be chosen. The species and method of reforestation must also be selected. Fire, insects, and disease can destroy forests and must be controlled.

  Diseased or unwanted trees are just like weeds. They steal sunlight and nutrients from other trees and must be removed.

- **Thinning** is choosing certain trees to be removed to make the entire stand grow faster and stronger. Thinned wood is usually small or diseased. If hardwood is thinned, the wood is usually sold for firewood. Softwoods can be used for thin posts or poles or used for pulp then made into paper or other products.

- **Harvesting** is cutting down trees that are ready to be processed and taking them to a processing plant. Harvesting can be done by large companies or by small, independent companies.

- **Reforestation** is planting new trees where older trees have been harvested. It protects the environment, provides recreation, wildlife habitat, and a profitable crop for the future.

All your life you've been told "Pick up after yourself." If you just never got the hang of doing that, consider a career in harvesting timber. When a stand is harvested, leaves, cuttings, and other small scraps are left scattered on the ground. These provide habitat for small wildlife and add nutrients to the soil.

OBJECTIVE 6 **Describe the steps in processing raw timber.**

After trees are harvested, the timber is processed. Some is processed into lumber, the rest can be used for wood-based products. The process contains three major steps:

- The logs are transported to a mill.

- The logs are sorted according to their size and condition. They are then cut into lumber and treated, or may be processed into plywood or paper.

- Wood chips, pulp, and by-products can be processed [illegible] a wide variety of products.

  NOTE: A large mill will process all the timber cut. A small mill will use part of it and sell the byproducts to other companies.

> If you began planting trees right now and planted one tree per second without ever stopping, it would still take you over 3,000 years to plant as many trees as are growing on tree farms today.

OBJECTIVE 7

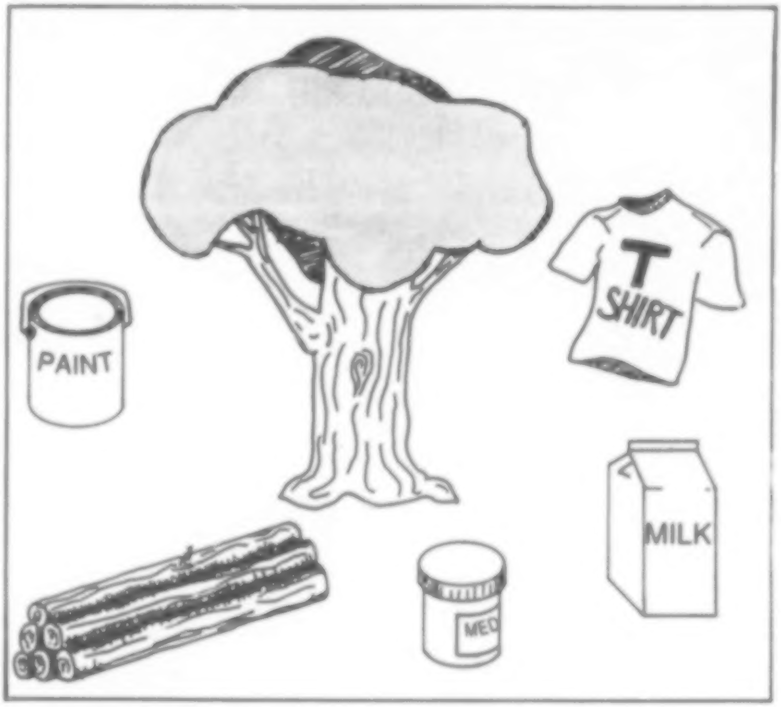
State examples of the variety of forest products.

You probably can't imagine the number of products you have used today that are actually forest products. The synthetic clothes you are wearing, the comb in your pocket, and the deodorant you used this morning, all contain wood products.

- **Lumber and products made from lumber** are probably the most familiar forestry products. This wood is used for construction and decoration in our homes, buildings and our furniture, and in smaller items like wooden toys, bowls, pencils, and toothpicks.
- **Paper products** include paper and cardboard. It's difficult to imagine the amount of paper, cardboard, and newsprint we use each year for reading, writing, and packaging. Paper products are also used for roofing felt, disposable diapers, paper towels, and milk cartons.

> Americans use almost 700 pounds of paper each year. In 1989, we used paper for 24 billion newspapers, 2 billion books, 350 million magazines, 12 billion catalogs, and enough corrugated cardboard to cover the state of Maryland.

- **Food** from trees includes nuts, fruits, and flavorings such as sassafras (root beer) and maple syrup.



- **Chemicals** in trees are used in a variety of products including food additives, plastics, and medicines. They are also used in the processing of a wide range of other products. Research about and the manufacture of chemicals from trees is a rapidly growing field.

- **Oils and tars** are used for linseed oil, pine tar, sealants, paints, thinners, and cleaners.

- **Reforestation** – Another product of tree farming. Areas affected by industrial change or natural disaster can be transformed to tree farms. Forests now stand where coal strip mines or gravel pits once scarred the landscape.

- And we can't forget another important forest product: **Christmas trees!**

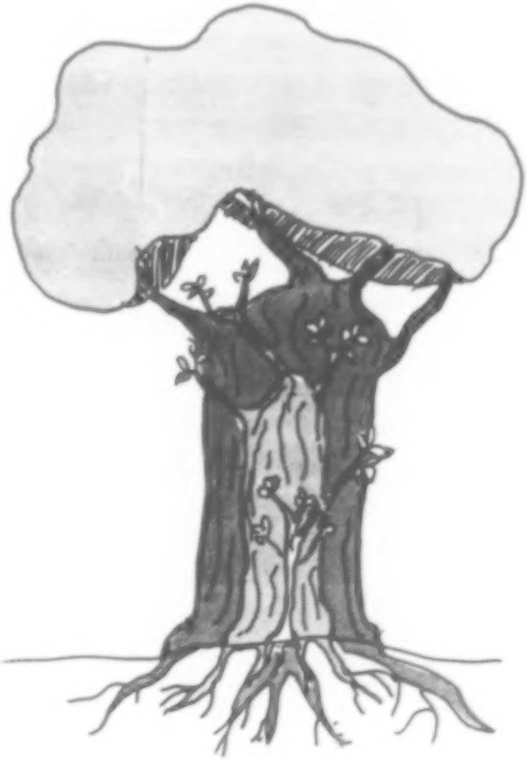
For a more complete (and a very surprising) list of products, read Student Supplement 3.

HOW TREES GROW

When you grow, everything gets bigger. Your heart enlarges, your legs get longer, your brain expands. Trees grow a little differently.

As a tree grows, it becomes taller and thicker. But instead of each part of the tree enlarging, "layers" of the tree are added. Rings of the trunk make it look thicker. New branches and leaves grow on the top of the tree to make it taller. New roots grow deeper underground and farther out to expand its base.

In fact, trees are so stable in their layering, that if you make a mark on a tree trunk three feet off the ground, then come back ten years later, the mark will still be three feet off the ground.



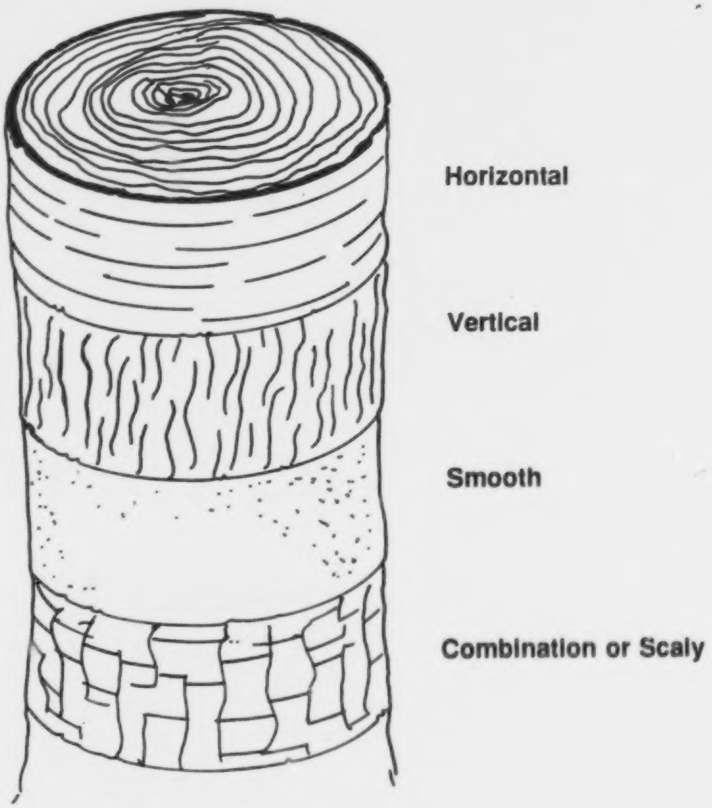
Like you, a tree has certain nutritional needs. Proper amounts of light, moisture, temperature, air, and soil must all be available to the tree. If the tree gets too little or too much water or light, if the temperature is too cold or too hot, or the soil too rich or too poor, tree growth can be stunted or the tree may become susceptible to disease, or may even die.

HOW TREES ARE IDENTIFIED

There are many, many types of trees. Most of us can identify a few trees, especially those in our yards or near our homes. Very few people can identify more than a few of them. Even experts use field books that list different tree families and species. These books classify trees by comparing bark, common fruits, leaf shape and arrangement, and flowers.

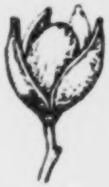
Bark

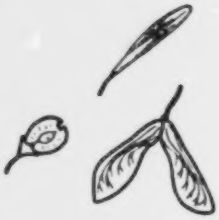
There are four basic types of bark:

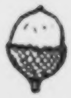


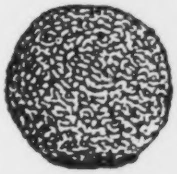
Common Fruits

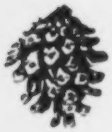
Apples, acorns, and pine cones are all different types of seeds produced by trees. These are all broadly considered fruits and since they can be so different, this is another way of identifying trees.

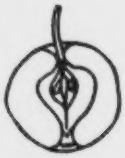

Nut
(Hickory)


Keys (Samaras)


Acorn
(Oak)


Multiple
(Osage-orange)

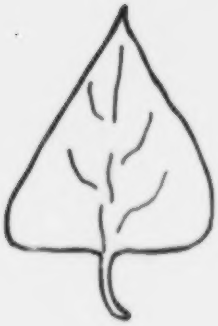

Cone
(Pine)


Pome
(Apple)

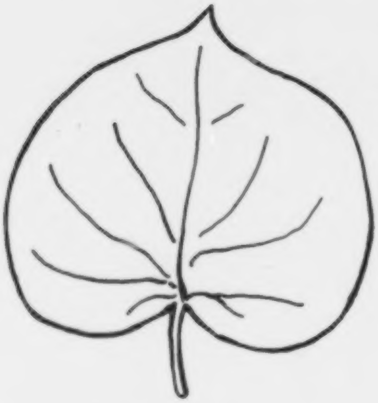
Courtesy of Oklahoma Forestry Division, State Department of Agriculture

Leaf shape

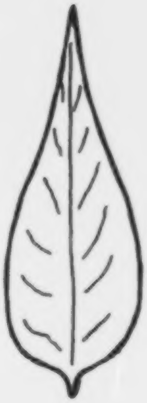
There are many different leaf shapes. The chart below shows a few basic shapes, but you will find many more as you look at trees.



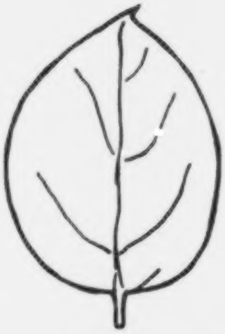
Deltoid
Triangular
EX: Cottonwood



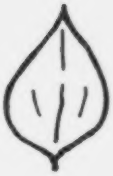
Reniform
Kidney-shaped
EX: Redbud



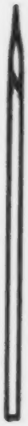
Lanceolate
Lance-shaped
EX: Black willow



Oval
A broad
ellipse
EX: Dogwood



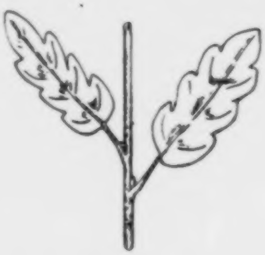
Scalelike or Awl-shaped
Small, short, sharp-pointed overlapped
or close together
EX: Eastern Redcedar



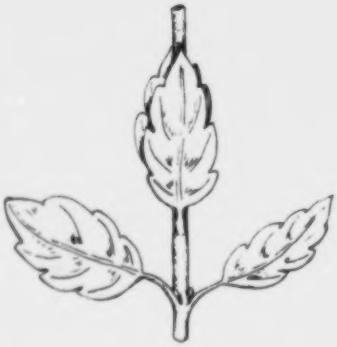
Acicular
Needlelike pine leaves
EX: Pine

Leaf arrangements

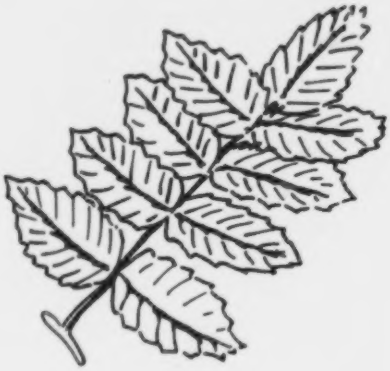
Leaf arrangement is how leaves are placed on the twigs. Some basic leaf arrangements are shown below.



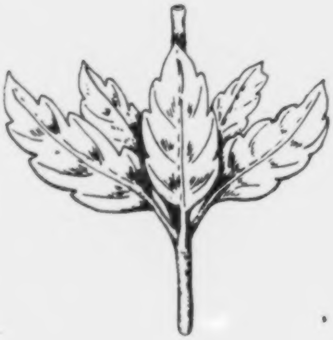
Alternate



Opposite



Pinnately Compound



Whorled

NOT SO OBVIOUS PRODUCTS FROM TREES

You can list many things made from tree-products, but would you list vanilla flavoring, plastic, tires, or film? When mixed with other ingredients, these and many other common items are made from tree products.

Products from Cellulose Fiber Filler

Urethanes
Plastics for toys
Bubble cover packaging
Floor tiles
Plastic twines
Counter tops
Molded wood products
Molded luggage

Wood Extractives

Soaps
Oil varnishes
Solder fluxes
Wood preservatives
Floor polishes
Lacquers
Paints
Solvents
Paint removers
Turpentines
Detergent soaps
Enamels

Cellulose or Cellulose Acetate

Backings for photographic films
Insulation or sound-proofing materials
Filtering agents
Bath mats
Auto tires
Speaker cones
Sandwich bags
Acetates and rayon for clothing
Packaging

ACTIVITY SHEET 1

Development of:
READING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, creative thinking/problem solving skills and social studies skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Gaining factual information
  - Selecting useful resources
  - Locating resources
  - Using standard references

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Creating a finished product

  SOCIAL STUDIES SKILLS

  - Investigating/applying U.S. history

- If students have difficulty gaining factual information:

  - Suggest they read carefully noting key words and ideas.
  - Instruct them to list the questions they hope to answer.

- If students have difficulty selecting useful resources:

  - Discuss various resources they could use.
  - Discuss the type of information needed.

    EXAMPLE: Definitions, dates, instructions, historical facts, names

- If students have difficulty locating resources:
  - Discuss different ways of obtaining the information.
  - Invite a librarian to discuss available resources and how to use them.
  - Review basic library skills.
- If students have difficulty using standard references:
  - Locate and explain the purpose of the reference section of the library.
  - Discuss the fact that each standard reference provides a specific type of information.
  - Discuss what kind of information the students need to find.
  - Review the use of in-book reference tools.
  - Discuss the importance of being able to use standard references.
- If students have difficulty creating a finished product:
  - Review the analysis and synthesis of information to determine whether the conclusions are correct.
  - Review the action plan to determine whether it will bring the desired results.
  - Discuss the way in which the finished product is organized.
  - Review the requirements of the assignment.
  - Instruct them to work one step at a time until the project is finished.
- If students have difficulty investigating/applying U.S. history:
  - Discuss the importance of understanding historical events and how they influence us today.
  - Have students identify important historical events since their birth and discuss how they have affected their lives.

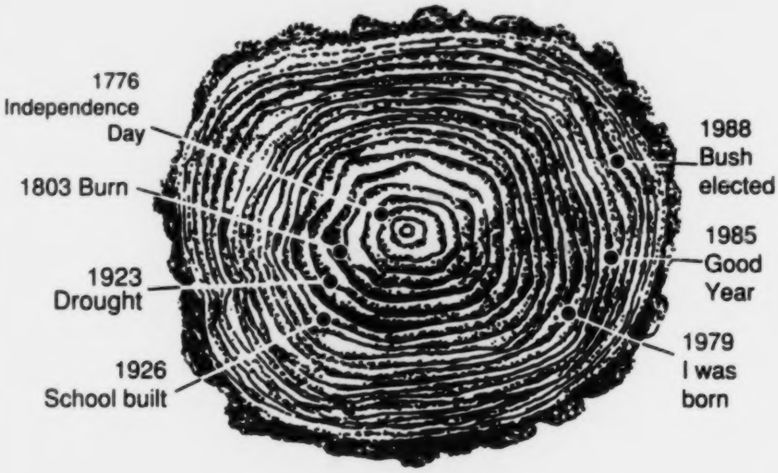
DETERMINE THE AGE OF A TREE

The age of a tree may surprise you. There are trees standing today that are older than our nation. Imagine what changes have occurred during their lives: from the minuet to modern music; from slavery to civil liberty; from hand tools to high-tech tools and television, and from horse-and-buggies to jet planes and space travel. It can be hard to imagine how old these trees are until you have charted some of the history they have seen.

To determine the age of a tree, look at a cross section of the trunk. Remember that the tree trunk becomes thicker as the tree grows. The trunk's growth and the yearly cycle of blooming and hibernation combine to make rings. A ring is made up of one layer of light wood and one layer of dark wood.

The outer-most ring under the bark was formed one year ago. Each ring represents one more year. Count the number of rings and you will know the age of the tree.

Now, identify some important events that occurred during the life of the tree. You could use an almanac, an encyclopedia, and old magazines and newspapers. Include presidents who were elected, beginning and ending dates of wars, the year your school was built, and scientific discoveries. Label the year and the event.



Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Select useful resources
- Locate resources
- Use standard references

Cognitive Activities Skills
- Create a finished product

Social Studies Application Skills
- Investigate/apply U.S. history

Look at the rings and see what you can tell about each one. Thin rings indicate drought. Burns or injuries to the tree will be evident in the rings. Thick rings indicate rapid growth. Identify at least three rings and label what you know from them.

Display your map of history.

JOB SHEET 1

Development of:
READING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, creative thinking/problem solving skills and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Analyzing/synthesizing information
  - Drawing conclusions

  EMPLOYABILITY SKILLS

  - Practicing good work habits/attitudes

- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.

- If students have difficulty analyzing/synthesizing information:
  - Remind them that to analyze they must break the information down into all its component parts in order to understand it.
  - Remind them that to synthesize information they should put all the component parts together in a way that makes the information usable.

- If students have difficulty drawing conclusions direct them to examine the collected data and look for patterns, the range of ideas expressed, the language used, the pictures or illustrations that accompany the information and what they are trying to get the reader to believe.

- If students have difficulty developing good work habits/attitudes:

  - Encourage them to become familiar with the entire procedure before they begin the work.

  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.

  - Discuss what behaviors and attitudes constitute good work habits.

  - Make sure the student knows what is expected of him or her.

OBJECTIVE 8 **Compare sawing hard and soft wood.**

INTRODUCTION

How hard is hard wood? How soft is soft? Does the hardness of the wood make a difference in processing and using the wood? Oh no, this time you don't get answers. This time you have to find them on your own.

EQUIPMENT AND SUPPLIES

- Hard wood logs or boards such as walnut, oak, or elm
- Soft wood logs or boards such as cedar, pine, or redwood
- Unidentified logs or boards
- Hand saws

PROCEDURE

1. Get the log of hard wood.
2. Put the log on a work table with one end sticking off the side of the table.
3. Hold the log steady with one hand and hold the saw with the other. Put your weight on the wood.
4. Cut the log by moving the saw smoothly over the wood. Extend your arm completely and draw it back without pausing. Do not push down on the saw, just run it over the wood and let it do the work.
5. Repeat steps 1-4 with the log of soft wood.
6. Look at the pieces you sawed. Compare the way it felt to saw them and the way they look.
7. Cut an unidentified piece of wood and decide whether you think it is hard or soft wood and why. Write your answer here.

   ____

   ____

   ____

   ____

8. Have your instructor check your work.
9. Put tools and materials away and clean your work area.

Functional Reading Skills
- Follow written instructions

Cognitive Activities Skills
- Analyze/synthesize information
- Draw conclusions

Job Acquisition/ Development Skills
- Practice good work habits/attitudes

JOB SHEET 2

Development of:
READING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, science, creative thinking/problem solving, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Using standard references

  - Following written instructions

  SCIENCE SKILLS

  - Collecting specimens

  - Identifying/classifying living organisms

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Creating a finished product

  EMPLOYABILITY SKILLS

  - Practicing good work habits/attitudes

- If students have difficulty collecting specimens:

  - Review procedure for collecting samples.

  - Explain the necessity for keeping samples separate and labeled, and uncontaminated.

  - Allow students to practice collecting samples before completing the job sheet.

- If students have difficulty identifying/classifying living organisms:
  - Review the use of the identification field guide.
  - Work on identifying parts and combining the known parts into the whole.
  - Discuss binomial nomenclature:

    The scientific name consists of two Latin names. the first is the *generic* name, or the plant's group name, such as *Pinus* for pine, *Quercus* for oak, and *Juniperus* for juniper. The generic name is always capitalized. The second name is the *specific* name, identifying the species, such as *alba* (white) and *rubra* (red). A white pine has the scientific name of *Pinus alba*. The specific name is not capitalized.
  - Scientific names are in Latin and are written in italics. If they are written by hand or on a typewriter they should be underlined.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

JOB SHEET 2 — FORESTRY — VI

OBJECTIVE 9

Make an identification table of local trees.

INTRODUCTION

Now that you know a little more about trees in general, it is time to learn more about the trees in your area. What type are they? How do you know what type are they? Learn about the trees around you and share the information by making a tree identification chart.

EQUIPMENT AND SUPPLIES

- Tree identification field guide
- Flower press
- Pruners
- Camera and film
- Plywood or heavy cardboard
- Glue
- Notebook with paper
- Pencil

PROCEDURE

Research and Reference Skills
- Use standard references

Functional Reading Skills
- Follow written instructions

General Science Skills
- Collect specimens

Life Science Skills
- Identify/classify living organisms

1. Visit a nearby forest or stand of trees.
2. Using the field guide, identify at least ten different trees.
3. For each tree identified, take two photographs. One photo needs to show the shape and size of the tree and the second will be a close-up of the bark.
4. Using the pruners, remove a twig from the tree. Place the twig in the flower press.

   NOTE: Be sure that the leaves are as flat as possible.
5. If the tree is flowering, place a flower in the flower press, too.
6. Let twigs and flowers dry and flatten.
7. Mount the photographs, twigs and flowers on the plywood or heavy cardboard.
8. Add a label with the tree's common and scientific name.
9. Have your instructor check your work.
10. Put tools and materials away and clean your work area.

Cognitive Activities Skills

- Create a finished product

Job Acquisition/ Development Skills

- Practice good work habits/attitudes

JOB SHEET 3

Development of:
READING SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions
  - Interpreting graphics & symbols

  SCIENCE SKILLS

  - Investigating conservation of living resources
  - Investigating issues of environmental impact

  EMPLOYABILITY SKILLS

  - Practicing good work habits/attitudes

- If students have difficulty interpreting graphics and symbols, review the structure of the chart.

- If students have difficulty investigating conservation of living resources:

  - Discuss which living resources are part of this assignment
  - Invite discussion of current issues.
  - Assign readings in current related topics.
  - Discuss the importance of conservation and environmental impact.

- If students have difficulty investigating issues of environmental impact:
  - Discuss the importance of understanding environmental issues.
  - Discuss the possible consequences of ignoring or being uninformed about issues of environmental impact.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 2.

JOB SHEET 3 FORESTRY VI

OBJECTIVE 10

Recycle paper.

INTRODUCTION

What is the biggest garbage problem in America today? Most people guess plastic, because it is not biodegradable. But it's not plastic, it's paper. America uses so much paper each year that landfills cannot hold our scraps. But paper can be recycled. Recycled paper includes fibers from new wood pulp, but also includes fibers from already-used paper. The paper industry recycles about one-third of the paper it makes, and hopes to increase that amount every year.

EQUIPMENT AND SUPPLIES

- Scrap paper
- Water
- Blender
- Framed screen no bigger than 10" × 12"
- Bowl or tub big enough to hold the screen with 2 - 3 inches left on each side
- Piece of cardboard the same size as surface of screen
- Flat surface (countertop, tabletop, etc.)
- Flat towels
- Scissors or paper cutter
- Water

PROCEDURE

1. Cut scrap paper into pieces no more than 3 inches square.
2. Put paper scraps loosely in the blender until it is about half full.
3. Add water until all the paper is covered.
4. Turn the blender to "puree." Let it run until all the paper is ground up.

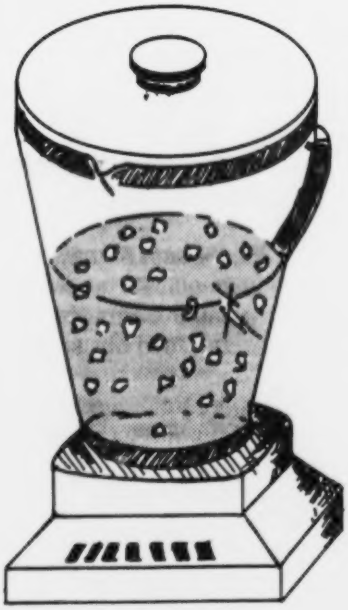
   NOTE: There should still be some recognizable pieces of paper in the mixture. Do not blend until it looks like water.

Functional Reading Skills
- Follow written instructions
- Interpret graphics & symbols

Earth Science Skills
- Investigate conservation of living resources
- Investigate issues of environmental impact

Job Acquisition/ Development Skills

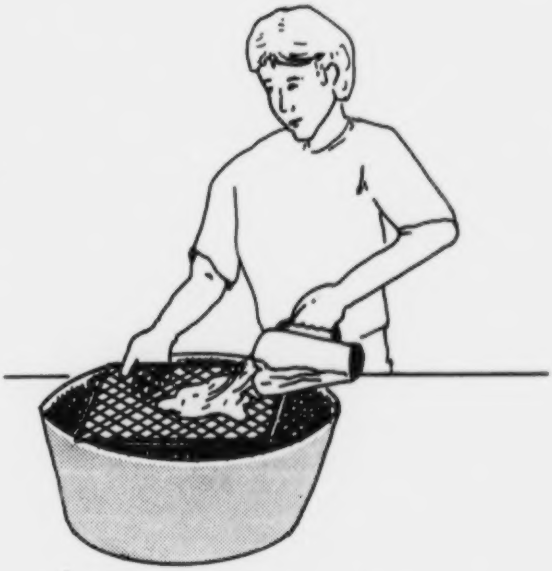
- Practice good work habits/attitudes



5. Place the screen in the bottom of the bowl or tub.

6. Pour the mixture on the screen until the screen is covered with the paper mixture.

   NOTE: The more you pour on the screen, the thicker the paper will be.



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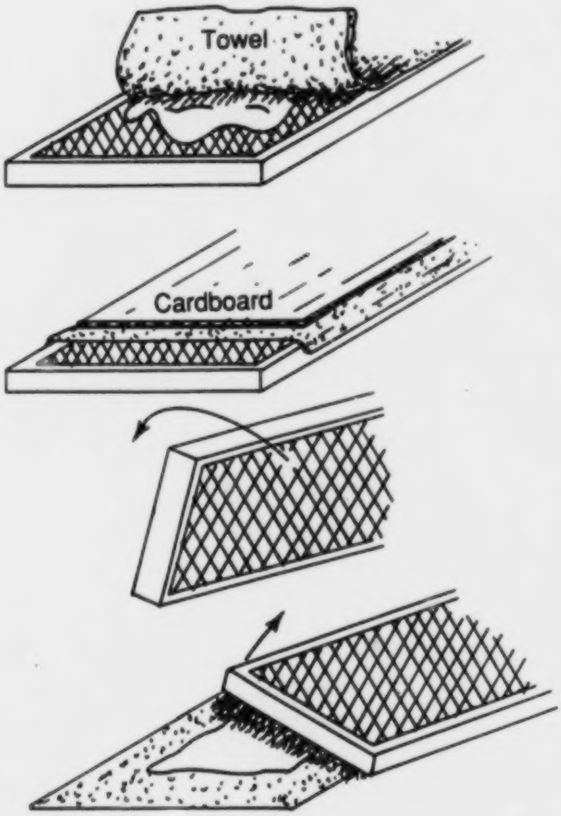
7. Lift the screen and let the water drip into the bowl.

8. When the water stops dripping, carefully, turn the screen upside down. Peel the paper from the screen and lay it on a flat surface, such as a counter-top.



9. Leave the paper out until it dries.

10. Trim the paper.

    NOTE: You can decorate it by printing holiday or school designs on the paper.

11. Have your instructor check your work.

12. Put tools and materials away and clean your work area.

JOB SHEET 1

Compare sawing hard and soft wood.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Sawed hard and soft wood	___	___
2. Compared how the woods looked after being sawed	___	___
3. Sawed unidentified piece of wood	___	___
4. Decided whether it was hard or soft wood and gave reasons why	___	___
5. Used proper tools correctly	___	___
6. Performed steps in a timely manner	___	___
7. Provided satisfactory responses to questions asked	___	___
8. Put tools away and cleaned work area	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Used a saw properly	4	3	2	1
Described differences in hard and soft wood	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 2 — FORESTRY — VI

JOB SHEET 2

Make an identification table of local trees.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Used a field guide to identify ten different trees	___	___
2. Pruned twigs and flowers	___	___
3. Pressed twigs and flowers	___	___
4. Took photographs	___	___
5. Mounted all information	___	___
6. Labeled trees correctly	___	___
7. Used proper tools correctly	___	___
8. Performed steps in a timely manner	___	___
9. Provided satisfactory responses to questions asked	___	___
10. Put tools away and cleaned work area	___	___

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Identified ten trees	4	3	2	1
Made a tree identification chart	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
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1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3 — FORESTRY — VI

JOB SHEET 3

Recycle paper.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Cut scrap paper and put loosely in blender and covered with water	___	___
2. Pureed paper	___	___
3. Poured paper mixture over screen	___	___
4. Transferred paper to drying area	___	___
5. Trimmed paper	___	___
6. Used proper tools correctly	___	___
7. Performed steps in a timely manner	___	___
8. Provided satisfactory responses to questions asked	___	___
9. Put tools away and cleaned work area	___	___

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Recycled paper 4 3 2 1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

FORESTRY

VI

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with forestry to their definitions. Write the correct letter in the blank.

Part I

_____ 1. An area in a forest cleared of trees to prevent the spread of fire and give fire fighters an area to operate from

_____ 2. A method of harvesting trees in which all or nearly all trees in an area are removed

_____ 3. Young, small trees

_____ 4. The planned or actual time between planting and harvesting a crop of trees

_____ 5. The amount of cut wood in a stack 4 feet high, 4 feet wide, and 8 feet long

_____ 6. Contains few pockets of air or fluid

_____ 7. A stand of trees that are all nearly the same age

_____ 8. A measurement of wood, usually half a cord

_____ 9. The uppermost branching layer of a forest

a. canopy
b. clear cutting
c. cord
d. even-aged
e. fire line
f. fire break
g. habitat
h. interval
i. nonporous
j. overhang
k. porous
l. rick
m. rotation
n. seedlings
o. uneven-aged

May be photocopied for student use.

Part II

_____ 1. A stand of trees with three or more different ages

_____ 2. A group of trees planted or arranged in a way that blocks the wind

_____ 3. A farm on which trees are raised as a crop

_____ 4. A group of trees

_____ 5. The science of forest management

_____ 6. A large area of tree growth

_____ 7. 4.5 feet from the ground, the standard place trees are measured

_____ 8. Contains pockets that can be filled with air or fluid

_____ 9. The environment where an animal or species of animals live

a. BDH
b. cultivation
c. DBH
d. ecology
e. even-aged
f. fire lane
g. forest
h. habitat
i. nonporous
j. porous
k. silviculture
l. stand
m. tree farm
n. uneven-aged
o. windbreak

OBJECTIVE 2 **List benefits of trees.** List five benefits of trees.

1. ____

____

2. ____

____

3. ____

____

4. ____

____

May be photocopied for student use.

5. ____

____

OBJECTIVE 3

Choose the word or phrase that completes statements about hardwoods and softwoods. Write the correct letter in the blanks.

_____ 1. The names hardwood and softwood come from the types of wood

a. texture
b. cells
c. uses
d. strength

_____ 2. Usually deciduous trees are

a. softwoods
b. porous
c. hardwoods
d. evergreens

_____ 3. Conifers are usually

a. softwoods
b. hardwoods
c. nonporous
d. elms or maples

OBJECTIVE 4

Distinguish among types of forests. Write "TR" for tropical rain forest, "TH" for temperate hardwood forest or "C" for coniferous forest in the blank before each statement describing each particular type of forest.

_____ 1. This type of forest makes up about half of the world's forest area.

_____ 2. These forests thrive in the Northern Hemisphere, especially in the northwest United States.

_____ 3. This type of forest accounts for about 15 percent of forest land today.

_____ 4. This type of forest is found along the coasts and rivers of equatorial Africa and Australia.

_____ 5. The trees in this type forest may be 150 feet high and contain more than 80 species.

May be photocopied for student use.

_____ 6. These forests are a main source of timber and wood products.

_____ 7. The largest of these type forests are found in Eastern and Central United States, Central Europe, and Asia.

_____ 8. This type of forest is about 100 feet high and contain few different species.

OBJECTIVE 5

Select from a list forestry skills. Write an "X" in the blanks before forestry skills.

_____ 1. Planning

_____ 2. Processing

_____ 3. Thinning

_____ 4. Harvesting

_____ 5. Reforestation

_____ 6. Fire fighting

OBJECTIVE 6

Describe the steps in processing raw timber. Write the three major steps below.

1. ____

____

____

2. ____

____

____

3. ____

____

____

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OBJECTIVE 7

State examples of the variety of forest products. State three wood products in the space below.

1. ______________________________

2. ______________________________

3. ______________________________

NOTE: Objectives 8, 9, and 10 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

OBJECTIVE 1

Part I		Part II	
1.	f	1.	n
2.	b	2.	o
3.	n	3.	m
4.	m	4.	l
5.	c	5.	k
6.	i	6.	g
7.	d	7.	c
8.	l	8.	j
9.	a	9.	h

OBJECTIVE 2

Answers should include any five of the following:

Trees clean the air.
Trees cool the air.
Trees reduce noise pollution.
Trees increase property value.
Trees prevent soil erosion.
Trees attract and protect wildlife.
Trees provide privacy.
Trees provide a large number of products.
Trees are a renewable resource.

OBJECTIVE 3

1.	b
2.	c
3.	a

OBJECTIVE 4

1. TR
2. C
3. TH
4. TR
5. TR
6. C
7. TH
8. C

OBJECTIVE 5

1, 3, 4, 5

OBJECTIVE 6

Description should include the following major ideas:

- The logs are transported to a mill.
- The logs are sorted according to their size and condition. They are then cut into lumber and treated, or may be processed into plywood or paper.
- Wood chips, pulp, and by-products can be processed into a wide variety of products.

OBJECTIVE 7

Answers should include any three of the following wood products:

- Lumber and lumber products
- Paper products
- Food
- Chemicals
- Oils and tars
- Reforestation
- Christmas trees

OBJECTIVE SHEET

FIELD CROP PRODUCTION

VII

INTRODUCTION

To many people, "agriculture" means "farming." Growing crops like corn, wheat, milo, or fruits has always been an important industry for America and for most other countries. But changes in technology, environmental concerns, and farm management affect today's field crop industry. The number of independent farms is declining. Fewer young people plan to go into farming. Even so, the amount of food produced by farmers increases each year. More women and minorities are becoming farmers. And new careers related to farming are open to young people.

UNIT OBJECTIVE

After completing this unit the student will be able to name and describe factors affecting field crop production, weed and pest control, independent and corporate farming, and local and international field crops. The student will demonstrate these competencies by completing assignment sheets and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with field crop production to their definitions.
2. Choose the word or phrase that completes statements about what is needed to produce field crops.
3. Select from a list true statements about fertilizers and pest control.
4. Distinguish between characteristics of independent and corporate farming.
5. List factors affecting choice of crop.
6. Survey local crops. (Assignment Sheet 1)
7. Compare local field crops to those grown in other countries with similar climates. (Assignment Sheet 2)
8. Chart field crop growth on a world map. (Assignment Sheet 3)

PREPARATION

- Order materials to supplement the unit.

  NOTE: See Suggested Resources

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Invite representatives from the field crop area to discuss unit information. Possible speakers include independent and corporate farmers, county extension agents, agronomists, ASCS or SCS agents, and farm managers.

  NOTE: Supply guest speakers with the Objective Sheet, Information Sheet, and any other components you want them to cover.

- Make arrangements for any audiovisual equipment that will be needed for this unit.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with field crop production to their definitions.

- Add terms used by guest speakers or presented by you during the unit.

- Have students suggest examples of pesticides, fungicides, insecticides, and herbicides.

- Discuss the difference between herbicides and defoliants.

- Use Extensions & Options, Student Supplements 1-3, Transparency Masters 1-4, and Activity Sheets 1, 2, and 3 to introduce the unit.
- Have students complete Assignment Sheet 1.
- Discuss types of application used in your area such as broadcasting, band spraying, side dressing, etc.
- Invite your county ASCS or SCS agent to discuss LISA (Low Input Sustainable Agriculture).

Objective 2: Choose the word or phrase that completes statements about what is needed to produce field crops.

- This list contains general information. Additional needs may be associated with major crops in your area.
- Have students suggest why each factor is necessary and, if possible, give an example of a crop affected by it.
- Have students determine which factors can be changed or controlled and which cannot.
- Have students discuss how technology has affected each factor.
- Have students suggest future technology associated with each factor.
- Visit a farm and have students note how each factor is or is not present and why.
- Show the video, *The Grapes of Wrath* and discuss how things have changed or remained the same. Have them discuss how field crop failure affected individuals, governments, the economy, and businesses. Have them brainstorm what would happen today if a similar crop failure occurred.
- If a small plot for class use is available, have students assess its characteristics and choose crop(s).
- Use Student Supplements 3 and 4 and Transparency Master 5 to support objective material.

Objective 3: Select from a list true statements about fertilizers and pest control.

- Have students collect samples of field crops.
- Have students collect samples of plants damaged by diseases and pests.

- Invite farmers who have made some changes in how they use fertilizers and pesticides to discuss what changes they made, why they made the changes, and what effect they have seen.

- Invite an environmentalist to discuss the role of farming in soil conservation, water conservation, etc.

- Discuss fertilizer and pesticide use for area crops.

- Invite an entomologist to discuss the use of predator bugs to control pests and weeds.

- Refer to Extensions & Options in Unit IV, Plants and Soils.

- Have students analyze the soil from a classroom plot or schoolyard and add appropriate fertilizers.

- Grow crops in two separate plots, using sustainable agriculture pest control methods in one and chemical pesticides in another. Have students compare results.

- Grow crops in two separate plots, using no-till methods in one and exposed soil in the other. Have students compare the amount of water needed for each plot, soil loss, and results.

Objective 4: Distinguish between characteristics of independent and corporate farming.

- Invite representatives from each type of farming to discuss their businesses.

- Invite an agriculture economics specialist to discuss the trend to corporate farming and its effect on families in farming.

- Have students collect newspaper or magazine articles that illustrate both independent and corporate farming.

- Use Assignment Sheets 2 and 3 to support objective material.

- Figures given are the latest available when this unit was compiled. Contact your area, university, or county extension agent for more recent figures.

Objective 5: List factors affecting choice of crop.

- Distinguish between this objective, covering crop choice, and Objective 2, covering what is needed to raise field crops.

- As in Objective 2, some other considerations may be important in your area, depending on the crops normally grown there.

- Invite farmers who grow a variety of crops in your area to discuss the needs of each specific crop. Have them discuss rotation, fertilizing, harvesting, marketing, expenses, and day-to-day crop maintenance.

- Use Student Supplement 5 to support objective material.

APPLICATION

Objective 6: Survey local crops.

- Invite a county extension agent to discuss what is grown locally, why it is grown in your area, and the effect of the crop on local business and economics.

- Have students suggest other crops that could be grown in your area.

- Have students list crops not grown in your area and suggest why.

- Use Transparency Masters 6-14 to support objective material.

Objective 7: Compare local field crops to those grown in other countries with similar climates.

Objective 8: Chart field crop growth on a world map.

- Have students compare crops grown in the U.S. to crops grown in other countries. What trends do they see?

- Have students compare crops found in groups of similar countries. Group them by economic and technological levels, by geography and history, and by natural resources such as those bordering oceans or those with deserts.

- Have students survey local newspaper articles for news of field crops grown in other nations.

EVALUATION

Pretest

- Give written test as pretest.

- Determine individual study requirements.

- Counsel students individually on pretest results and study requirements.

- Modify material in unit or create supplementary materials for individual students as required.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Food for the Future.* Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709. Discusses the Land Pavilion at EPCOT Center, plants being raised there, and the research work of scientists. Order No. 18580. (18 minutes, color, VHS or 16mm film)
- *The Grapes of Wrath.* Available from your local video store or perhaps from your school's English department.
- *The Science of Genetics: Feeding a Growing World.* Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709. Shows genetic research in corn, soybeans, wheat, alfalfa, sorghum, and sunflowers. Available for free loan. Order No. 16203. (16mm film or ¾")
- *Soil: Its Meaning for Man.* Vocational Media Associates, Box 3000, Mt. Kisco, NY 10549. Discusses the importance of soil and soil misuses. (Two filmstrips and guide)

Other Resources

- *Basic Carrot Tissue Culture Kit,* Kit containing materials for removal of tissue from the parent plant, transfer to sterile nutrient material, and new plant formation. Available in two sizes: 1-2 cultures (Order # 19-1093) and 30 cultures (Order # 19-1905). Available from Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112.

- *Rootview.* A clear plastic plant growth chamber allows students to view root formation and growth. Available from Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112.

- *Seeds for Learning—Crop Plant Kit.* Set includes corn, oat, soybean, rye, barley, sunflower, wheat, flax, red clover, alfalfa, and timothy seeds. Available from Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112.

Print Media

- *Challenging Careers in Soil Conservation.* 18-page booklet describes the work of Soil Conservation Service employees. Available from the USDA-SCS, Room 0054-S, P. O. Box 2890, Washington, DC 20013.

- *Children's Gardens—A Field Guide for Teachers, Parents, and Volunteers.* A manual including step-by-step instructions for planning and producing a vegetable garden, learning activities that can be completed in the garden, and a resource directory. Available from the Common Ground Program, 2615 South Grand Avenue, Suite 400, Los Angeles, CA 90007.

- *Growlab—A Complete Guide to Gardening in the Classroom* and *Growlab—Activities for Growing Minds.* Two books including instructions on classroom gardening, plans for a GrowLab Indoor Garden, and lesson plans integrating gardening and basic skills. Available from the National Gardening Association, 180 Flynn Avenue, Burlington, VT 05401.

- Higham, Charles. *The Earliest Farmers and the First Cities.* A booklet discussing archaeological information on the early farmers in Turkey and the Tigris-Euphrates plain. Available through your local library or bookstore, ISBN# 0822512023.

- *A History of Spices.* A 15-page booklet describing the effect of spices on history and exploration. Available from the American Spice Trade Association, 580 Sylvan Avenue, Englewood Cliffs, NJ 07632.

- *How to Take a Soil Sample.* A color poster using cartoon drawings to illustrate soil sampling steps. Available from The Fertilizer Institute, 501 Second Street, NE, Washington, DC 20002.

- *Of the Earth: Agriculture and the New Biology.* A booklet describing the role of genetics and technology in producing more useful plants. Available from Corporate Public Affairs, Monsanto Company, 800 N. Lindberg Boulevard, St. Louis, MO 63167.

- *Organic Farming—The Whole Story.* A pamphlet describing the role of organic gardening. Available from the National Council for Environmental Balance, Inc., 4169 Westport Road, P. O. Box 7732, Louisville, KY 40257-0732.

- *The Positive Side of Pesticides.* A booklet dispelling many myths about pesticide use and technology. Available from the National Council for Environmental Balance, Inc., 4169 Westport Road, P. O. Box 7732, Louisville, KY 40257-0732.

- Pringle, Laurence. *What Good Is A Weed? Ecology in Action.* A book discussing 15 types of weeds, their usefulness, and their role in the food chain. Available from your local library or bookstore ISBN# 069004108X.

- Rahn, Joan Elma. *How Plants are Pollinated.* A book covering a wide variety of pollinating agents, including wind, animals, bees, butterflies, birds, bats, and water. Available through your local library or bookstore, ISBN# 068930482X.

- Riedman, Sarah R. and Rod Slater. *Gardening Without Soil.* A booklet introducing the student to hydroponics and how it can be useful. Available through your local library or bookstore, ISBN# 0531022560.

- *Saving Lives with Pesticides.* A pamphlet discussing the role of pesticides in protecting crops and promoting public health. Available from the National Council for Environmental Balance, Inc., 4169 Westport Road, P. O. Box 7732, Louisville, KY 40257-0732.

- Selsam, Millicent E. and Jerome Wexler. *Plants We Eat.* A book discussing the development of and changing uses for basic food crops. Available from your local bookstore or library, ISBN# 0688007198.

- *Teaching Soil and Water Conservation—A Classroom and Field Guide.* A booklet listing a variety of classroom activities designed to make students aware of the need for soil and water conservation. Available from USDA-SCS, Room 0054-S, P. O. Box 2890, Washington, DC 20013.

- The Oklahoma State University Cooperative Extension Service and Agricultural Experiment Station offer a wide variety of publications related to this topic. For a complete listing, contact your local county extension agent or Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550.

Software

- *Farm and Food Bytes—Soil and Water Conservation.* Kit containing computer software for Apple or IBM, student's study manual, and teacher's guide. Program incorporates soil conservation facts into basic subject material. Available from Agri-Education, Inc., 815 Shakespeare, Stratford, IA 50249.

UNIT REFERENCES

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PAST, PRESENT, AND FUTURE

Field crops have a history older than man. Before *Homo sapiens* ever walked on Earth, their predecessors, *Homo erectus* and *Homo habilis* knew of various uses for plants. They knew which were for eating, which were for medicines, and which were for making paints.

It isn't clear when man learned to farm, but it appears that he decided it was too much work. Farming was understood before it was widely practiced. Only after some towns were settled and serving as trading centers did farming become popular.

Sometime between 8000 and 9000 B.C., wheat and barley were farmed in Canaan (now Israel). By 7000 B.C. potatoes and beans were grown in Peru, pumpkins in Middle America, and rice was cultivated in Indochina. Other crops, such as squash, millet, citrus fruit, yams, and sugar cane followed. By 5000 B.C. irrigation systems were in use. Sometime between 3000 and 2500 B.C. cotton and silk production began. By 2000 B.C., plows were being used in Urek (Iraq) and Canaan (Israel) and rice paddies were built in southeast Asia. By 590 B.C., Chinese were using pesticides, and by 490 B.C. they were hoeing weeds, planting crops in rows, and applying manure.

But there is much more to agricultural history. It has affected politics and been used as a weapon. In ancient Spain, King Agis IV was executed when he supported agricultural reform. In 147 B.C., Rome destroyed Carthage, then sowed salt into the ground to prevent farming. Demand for foreign foods and spices led to exploration of the New World, Indian enslavement, and colonization of North and South America, Australia, Africa, and India. Agriculture was also a means of peace and humanitarianism. Cherokee Indians shared excess corn with tribes facing famine. By sharing farming methods and crops, peace was made between American pilgrims and Indians. Agriculture and foods allowed cultures to share their traditions and tools. For example, the Chinese, not Europeans, invented the fork!

Today, agriculture remains an important tool. Wheat sales to the U.S.S.R. were often agreed upon only after concessions in other areas. An embargo on Iraq preceded Operation Desert Shield in 1991.

May be photocopied for student use.

As we explore space, agriculture is there, too. Hydroponics (growing plants in nutrient-rich water) and tomato production have both taken place on space shuttle missions. Research into farming in moon soil is underway.

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OBJECTIVE 1

Match terms associated with field crop production to their definitions.

- **acre** — a parcel of land containing 4,840 square yards or 43,560 square feet
- **agronomy** — the science of soil management and crop production
- **application** — distributing seed, fertilizer, or pesticide over a designated area
- **fertilizer** — a substance that adds nutrients to the soil
- **field crops** — plants grown on a large plot of land, measured in acres

  NOTE: Field crop production does not include landscaping, hot-house production or other smaller-scale growing. Field crops usually involve plants grown for food (wheat), feed (alfalfa), or forage (rye grass).

- **fungi** — plants that live off other plants or dead organic matter, have no chlorophyll, roots, stems or leaves, and reproduce by spores
- **fungicide** — a substance used to control fungi

  NOTE: The suffix "-cide" means "to kill."

- **herbicide** — a substance used to control weeds
- **insecticide** — a substance used to control insects

A **pesticide** is any product used to control pests. Fungicides, herbicides and insecticides are types of pesticides. There are many others. Pesticides have been used for more than 2500 years. Without pesticides, many more plagues and famines would have occurred. It is largely due to the use of low-cost, effective pesticides that Americans have been able to enjoy a wide variety of nutritional, affordable food.

- **sustainable agriculture** — farming techniques designed for maximum conservation of soil and other resources

  EXAMPLES: Crop rotation, "organic" fertilizers, mulching, low-till or no-till

- **till** — to prepare the soil for planting

  EXAMPLES: Plowing, disking

- **weed** — a plant that is not desired and will use nutrients, space, and water intended for the crop

  NOTE: Other than desirability, there is no real difference between weeds and other crops. Plants considered to be weeds in one place, culture, or time, are cultivated in another. Clover, for example, was once grown as a lawn cover and dandelions have been grown for their leaves. Peanuts, now a major American cash crop, were considered useless for many years.

OBJECTIVE 2

Choose the word or phrase that completes statements about what is needed to produce field crops.

What does it take to raise field crops? A few seeds, a tractor and plow, a little water and some sun, and you've got it made, right? Wrong. There are many things to be considered. Will the soil support the crop? Will there be enough growing days? What will you do when the crop is ready for harvest? The list below includes some considerations, but for each area and each crop, specific needs must also be met to produce a quality product.

Location

- Soil suitability

  NOTE: Soil pH and fertility, ability to hold water, and other soil characteristics must meet the needs of the crops. This is explained more fully in Unit 4, "Plants and Soils."

- Useable slope

  NOTE: Some crops grow best on flat land. Furthermore, planting and harvesting machinery is difficult or impossible to operate on heavily sloped land. Using sloped land to grow corn and other crops that require exposed soil, may lead to soil erosion.

- Amount of wind

  NOTE: Christmas trees, for example, will grow crooked if constantly exposed to high winds. Too much wind can injure tender crops and erode soil.

- Suitable average temperature and temperature extremes

  NOTE: Early freezes, summer heat, and temperature extremes and averages are major considerations.

- Proper growing season length

  NOTE: The growing season must be long enough to allow the crop to complete the entire life cycle.

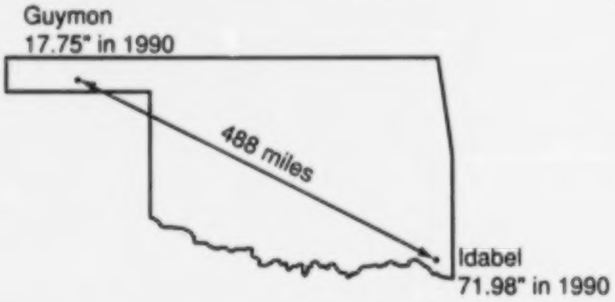
- Protection from erosion

  NOTE: Erosion steals the best soil from the farmer. Organic matter in the topsoil is not found in lower subsoil.

Water

- Accessibility to water for irrigation
- Adequate average rainfall
- Water table depth

Differences in rainfall determine what crops can be grown in a certain area. For example, from Guymon to Idabel, Oklahoma, average rainfall can vary by 40 inches or more.



Several factors dealing with water must be considered when raising field crops: the cost and time necessary to bring water to the crops, the regularity of rainfall, and rainfall seasons. For example, rain just before wheat harvesting can ruin the crop. The depth of the water table (water below the soil surface) can affect the growth of some plants.

- Suitable drainage

  NOTE: Drainage must be slow enough to allow water to soak into the ground, but complete enough to prevent flooding.

Cleared or clearable land

Transportation and marketing

- Access (a way to enter and leave the property)
- Storage facilities
- Processing facilities

  NOTE: Corporate farms can use central storage and processing facilities or can process the raw crop into finished retail products "right on the farm." Independent farmers can use storage facilities to store crops before transporting them to market or can store them for later use on the farm. Some independent farmers have formed cooperative organizations and built special storage and processing facilities that members can use. This allows them to compete with corporate farms.

Structures

- Fences
- Storage buildings
- Storage and protection for tools and vehicles

> It takes roughly 1,000 square feet of farm land to feed one adult for one year.
>
> - Ron Macher, publisher of *Missouri Farmer*

OBJECTIVE 3

Select from a list true statements about fertilizers and pest control.

Fertilizers

Just as humans need certain vitamins and minerals, plants need certain nutrients, especially nitrogen, phosphorus, and potassium. These nutrients are removed from the soil as crops grow and should be replaced.

The three most common nutrients, called primary elements, are nitrogen, phosphorus, and potassium. Other nutrients are calcium, magnesium, and sulfur, called the secondary elements, and boron, manganese, iron, chlorine, copper, molybdenum, and zinc, called micro-elements. Commercial fertilizers list the amounts of nitrogen, phosphorus, and potassium they contain. The first number is the percentage of nitrogen, the second is the percentage of phosphorus, and the third is the percentage of potassium. For example, 10-20-10 fertilizer contains 10 percent nitrogen, 20 percent phosphorus, and 10 percent potassium.

NOTE: Pure nitrogen, phosphorus, and potassium cannot be used. They are mixed with other elements, called carriers. In the example used above of 10-20-10 fertilizer, the remaining 60 percent is carrier.

Phosphorus is usually applied when the crop is planted. It does not move through the soil, so it is deposited next to the seed or sprayed on the roots of seedlings. Phosphorus helps the plant grow and use energy, produce flowers and seeds, develop healthy roots, and become winter hardy.

Nitrogen moves through the soil and can be applied to the soil before or during seeding, or spread over the plants when they start to grow (called topdressing). Nitrogen helps plants grow larger and faster and gives them a dark green color.

Potassium can be applied before or during seeding or spread over plants when they start to grow. It helps produce stronger, more disease-resistant plants with large seeds and grains. Oklahoma soils are usually high in potassium.

For fertilizing to be most beneficial, the soil must be tested. Wheat and corn farmer Roger Robbins explains that "Whatever is available is what the plant will use. If your soil has a lot of nitrogen, but little phosphorus, the plant will grow as much as the phosphorus allows then quit. Adding more nitrogen won't help. You need to add what the plant needs. In this example, you would need to add phosphorus." Soil testing can be performed by private laboratories, at government or university extension labs, or by fertilizer salespeople and distributors.

Pest control

There are three basic types of pests: insects, fungi, and weeds. At one time, pests were controlled by "working the soil." Soil was plowed, tilled, and cultivated to keep the soil constantly turned. Plants growing around the crop were destroyed, as were nests of insects. This method of crop management left soil exposed and moisture was lost. The uncovered soil was easily eroded by wind and rain.

Many farmers today rely on low-till or no-till farming. Pests are controlled through sprays or other methods and the soil is left covered by mulch or the remains of previous crops. This method conserves water and soil and reduces fuel costs.

Some alternatives to chemical application are:

- Using predator insects or birds to eat harmful insects
- Mulching around standing crops, blocking sunlight from weeds
- Removing weeds with flame
- Rotating crops to prevent a build-up of pests
- Interplanting other crops or plants that repel pests

Chemical applications

Chemicals are available in dry, liquid, and gaseous forms. They can be deposited with the seeds, applied to the soil when it is tilled, or sprayed on the soil or plants. Sprays can be applied from trucks, tractors, or airplanes. Aerial spraying is used on large areas, and the spray can be applied to smaller areas with a tractor or by using band spraying. Band spraying is applying chemicals to a confined area, such as along a plant row.

Chemicals can be very specialized. Some are made to control specific pests or diseases. Others will kill all plants or insects they contact. Chemicals must be handled with care and manufacturer's directions must be followed at all times or serious injury can result.

How plants, insects, and other pests react to pesticides is not as simple as you may believe. They adapt to changes in their environment to protect the continuation of their species. Plants develop poisons to repel pests and diseases. Bruce Ames, of the University of California at Berkeley explains that "Every plant has forty or fifty pesticides it makes to kill off predators and fungi. There's a big war going on between plants, animals, and insects. Plants couldn't survive if they weren't filled with toxic chemicals."

But those pests have made some changes themselves. For example, in 1977 the first aphid-soldiers were discovered. These members of the aphid colony attack and kill predator larvae and even full-grown predators. They use bites and horns to stab and wound maggots, ladybugs, flowerflies, and other predators. If disturbed, they will bite larger animals such as monkeys or humans. Their bites will draw blood and produce a rash. The soldier-aphids will even cooperate with some ants, trading a sweet fluid the soldiers secrete for ant-built walls protecting the colony.

OBJECTIVE 4

Distinguish between characteristics of independent and corporate farming.

When people speak of agriculture, one of the first things that comes to mind is the family farm. These farms have been important to American history for decades. Homestead farming led to westward expansion and settlement. Southern plantations began as family farms. New England farmers raising corn and other cash crops made up our revolutionary army. Some of America's heroes, like Abraham Lincoln, grew up on family farms.

But today, corporate farms are becoming more common. These operations, usually larger than family farms, are businesses owned by corporations.

There are some important differences between independent and corporate farms. Independent farms are managed by the farmer; corporate farms might be managed by a board of directors or a hired farm manager. Additionally, corporate farms are more likely to raise a single crop to meet corporate needs. An independent farmer, on the other hand, is more likely to diversify. If a crop fails or if the market drops, corporate farms can suffer a significant loss, but having several crops or operations helps independent farmers to get through a single bad season.

Also, corporate farm managers may be more concerned with meeting production goals. Protection and conservation of the land is often more important to independent farmers who have long ties to the land and long-range goals for the land.

The majority of today's population is two generations removed from the farm. Many consumers never see corn, wheat, or other crops growing in the fields. The lack of education about agriculture makes it difficult for many consumers to understand production methods and the economic and political problems facing agriculture nationally and worldwide. Everyone has the right and need to be ag-literate.

OBJECTIVE 5

List factors affecting choice of crop.

Location

- Growing season
- Soil
- Access to water
- Water table depth

Marketability

- Profitability
- Popularity

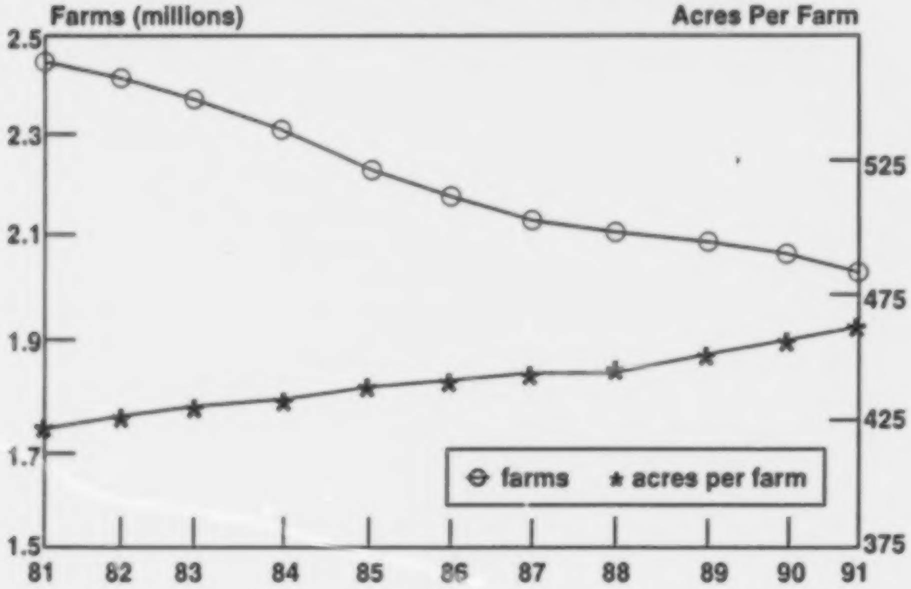
Goals of the operation

- Crop diversity
- Crop rotation
- Operating needs

NOTE: A corporate farm might produce only one crop to meet one need, such as cherries for frozen pies or tobacco for cigarettes. In other cases, crops are grown to meet operational needs such as feed or forage for livestock on the farm.

Availability of suitable varieties

Number of Farms and Average Farm Size United States, June 1, 1981 - 1991



Courtesy of National Agricultural Statistics and Service.

U. S. FARMLAND

Year	Number of farms (thousands)	Acres (thousands)	Average acreage
1850	1,449	293,561	203
1860	2,044	407,213	199
1870	2,660	407,735	153
1880	4,009	536,082	134
1890	4,565	623,219	137
1900	5,740	841,202	147
1910	6,366	881,431	139
1920	6,454	958,677	149
1930	6,295	990,112	157
1940	6,102	1,065,114	175
1950	5,388	1,161,420	216
1960	3,962	1,176,946	297
1970	2,954	1,102,769	373
1980	2,432	1,038,885	427
1985	2,275	1,014,000	446
1986	2,212	1,008,000	456
1987	2,173	1,002,000	461

Courtesy of National Agricultural Statistics Service.

U. S. FARM POPULATION

Year	Total (thousands)	% of total population
1880	21,973	43.8
1890	24,771	42.3
1900	29,875	41.9
1910	32,077	34.9
1920	31,974	30.1
1930	30,529	24.9
1940	30,547	23.2
1950	23,048	15.3
1960	15,635	8.7
1970	9,712	4.8
1980	6,051	2.7
1985	5,355	2.4
1986	5,226	2.2

Courtesy of National Agricultural Statistics Service.

TASTES AND TRENDS

How many foods do you know of? Probably more than you can count. But how many foods are there you don't know of? The answer may surprise you. One book, "Lost Foods of the Incas," is 415 pages long and discusses only one thing: foods the Incas ate that we don't eat today.

Since non-traditional crops are big business and America can import almost any food it doesn't grow, why are so many foods unfamiliar to us? There are several reasons, but, in most cases, it is because we don't want them. Culture and taste limit and influence markets. Consider this example:

Beans are a mainstay in Latin food. In Cuba, only black beans are used. In Mexico, some black or white beans are used, but the vast majority are pinto beans. In Colombia people prefer brown beans, in Venezuela they eat black beans and in Ecuador they don't eat beans at all.

Cultural tastes change as areas become more technologically advanced and begin to use convenience foods. In Africa, traditional foods such as yams and sorghum have been replaced in urban areas by wheat-based and processed foods such as sandwiches and frozen meals.

Today, there is a worldwide trend to eat more wheat and rice and less yams, sorghum, millet, and corn.

This same trend can be found in American history. Early settlers grew squash, yams, sorghum, corn, millet, and oats. Today, only corn and oats are still major crops.

A PARADISE OF PLANT LIFE

The focus is on fun for the tens of thousands of visitors who flock each day to the rides and exhibits at the Walt Disney World resort. But for plant scientist Dr. Mary Schon, the job she does at the sprawling resort near Orlando, Florida, has a serious side.

She's a member of a team of scientists hard at work exploring the frontiers of agriculture. Her laboratory at Walt Disney World's EPCOT Center is anything but a cramped, antiseptic room filled with rows of beakers and test tubes. When Schon comes to work each day she enters a little piece of paradise.

Giant plastic and glass domes radiate the bright Florida sunshine through six acres of gleaming, high-tech greenhouses. Lofty coconut palms tower over thickets of banana and papaya trees. Luxuriant plots of rice, sugarcane, and pineapples grow right up to the edge of a crystal-clear canal that carries boatloads of visitors through the lush plant life.

Schon's laboratory is The Land pavilion at the EPCOT Center, where scientists grow and study staple food crops from all over the world and test new sources of food. Their goal is to help develop and showcase new agricultural technologies to feed the earth's growing population—technologies that one day might allow space explorers to grow food on the moon.

Schon has a big job. She was trained at the University of Missouri as a plant nutritionist, and her specialty is the study of micronutrients. Micronutrients are chemical elements, like iron and zinc, that plants need in small amounts in order to grow. Her job is to make sure that the more than 50 species of plants grown in the pavillion get just the right mix of the minerals they need to stay healthy.

"We want to stretch the imagination and use research and modern technology to enhance agricultural prospects. We want to learn about the possibilities for agriculture in the future if we use our resources wisely," she says.

The greenhouses at The Land spotlight the endless creative possibilities for agriculture in the future. In one laboratory scientists use the latest techniques of tissue-culture to grow disease-resistant plants. Instead of growing from seed, plants like pineapples are duplicated using cells from a parent plant. In another lab, researchers are trying to duplicate lunar soils so they can study ways to grow food on the moon for future colonists.

Some of the most dramatic examples of scientific know-how at The Land are the hydroponic greenhouses, where vegetables like lettuce, peppers, and tomatoes are grown without soil. Instead, they are grown in special nutrient solutions that give them all the food they need.

Researchers at The Land are even growing vegetables in air, a technique called "aeroponics." The roots of pepper plants are periodically misted with nutrient solutions as they dangle down the insides of long canisters. The shoots of the plants tumble down the outside, producing brilliant clusters of bright peppers.

Scientists hope that one day hydroponic techniques can be used in spacecraft to produce plants to feed astronauts during their long journeys through space. The stunning exhibits are more than just a scientific pipe-dream. They could also be a very real way to provide enough food for the world's expanding population.

"We're trying to get maximum food production in a small amount of space," Schon says of the hydroponic experiments. "Farmers today are faced with the challenge of feeding a growing world population and doing so with a decreasing amount of land. Perhaps these techniques will allow us to produce larger amounts of food on the land we have."

Even with the most advanced technology there are still problems to be solved. That's where Schon's experience comes in. "I'm basically a trouble-shooter," she explains. "Here at The Land it's not quite heaven yet. We spend lots of time and effort each day keeping these plants healthy and green."

Schon is working to fine-tune the special fertilizer solution of 13 essential elements that plants at The Land receive.

"When I arrived here, I'd say about 80 percent of our plants were on the same nutrient solution," she says. "Even though all plants require the same basic nutrients, sometimes a plant needs more of a certain nutrient than at other times."

For example, when Schon first came to The Land she found that the rice plants were in trouble. Rice is one of the world's most important food grains, and at The Land scientists are experimenting with growing rice in sand that is irrigated with a nutrient solution.

But Schon found that the leaves of the rice plants were yellowish, instead of the lush green color they were supposed to be. She suspected that certain nutrients from the fertilizer solution had built up in the sand over the years. A tissue analysis of the plant confirmed her suspicion.

"Because of the nutrient buildup we got some very complex interactions in the sand system. Too much phosphorous had made it very difficult for the rice to use iron and manganese," Schon explains.

To help solve similar plant nutrition problems, Schon is working with a team of scientists at The Land to put a computerized feeding system for the greenhouses into place. In the future, a technician could simply punch in the different factors that affect a plant's growth—the temperature, the soil moisture, whether it's cloudy or sunny, the growth stage of the plant—and the computer would automatically adjust the fertilizer recipe.

When she's not busy tending to ailing plants, Schon continues her research into how micronutrients can change the way plants grow. At MU she studied how the element boron affected the growth of soybeans, sunflowers, and blueberries. Schon discovered that spraying the leaves of soybean plants with a solution of boron caused the plants to produce more branches and could increase soybean yields.

"It's amazing what effect a micronutrient can have. A pinch of boric acid in a gallon of water—that would cause a difference," she says. "Boron can change the growth form of a plant; it can change how a plant functions and how it takes up other nutrients."

Schon is excited about her research and the scientific knowledge she gained at MU. She credits her adviser, Dr. Dale Blevins, professor of agronomy, with stimulating her interest in creative research and providing her with a solid background in the plant sciences.

Growing up on a farm in Iowa sparked her first interest in science. She watched her father planting his fields and remembers wondering how the seeds he planted developed into sturdy crops of corn, oats, and soybeans.

Now she's using computers and her years of study to advance the science of agriculture even further. For the young scientists of tomorrow Schon says there will be even more challenges.

"When I left Mizzou," Schon says, "Dr. Blevins said to me, 'I hope you realize how lucky you are to have this kind of opportunity.' I know I'm lucky. What we're doing down here at The Land is probably the best thing that can be done to educate the public about the possibilities of agriculture. That's what plant science is all about."

Adapted with permission of University of Missouri-Columbia.

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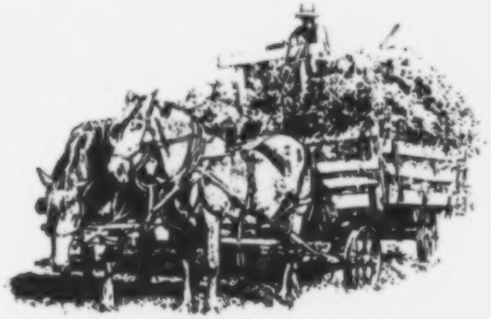
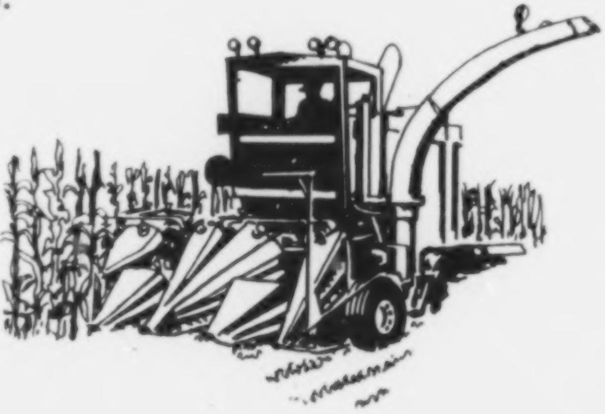
Modern Machines Help Farmers Produce More

1850 – It took a farmer 30 to 35 hours of labor to produce one acre of corn using draft animals, a walking plow, and planting by hand.



1930 – It took a farmer 6 to 8 hours to produce an acre of corn using horses and early tractors.



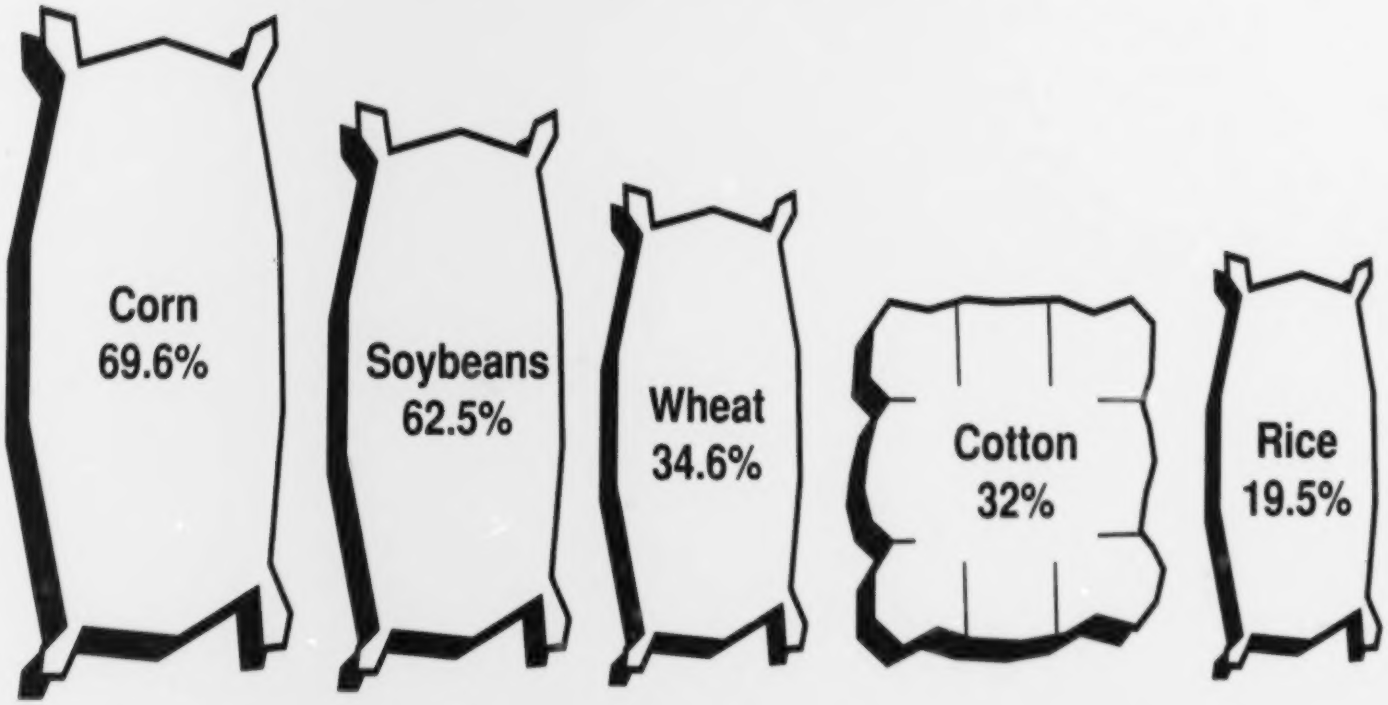
Today – It takes a farmer 2 to 3 hours to produce an acre of corn using modern tractors and harvesting equipment.

Adapted with permission of American Farm Bureau Federation.

TM 1

World Relies on U.S. Farm Exports

U.S. Share of World Market



The U.S. provided 52% of the world's grain trade in 1989-1990.

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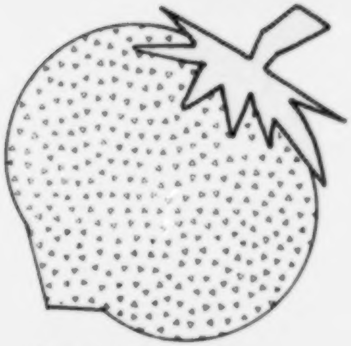
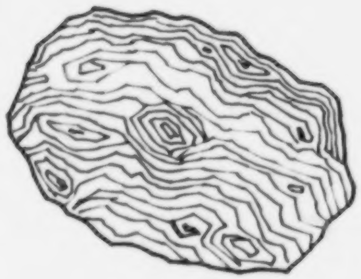
TM 2

What One Acre of Land Can Produce



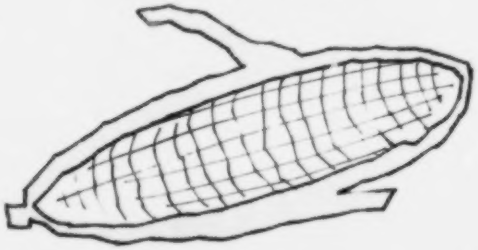
Strawberries
42,000 lbs./acre
worth $17,800/acre

Navel Oranges
24,000 lbs./acre
worth $2,300/acre



Lettuce
11,000 heads/acre
worth $4,000/acre

Potatoes
25,400 lbs./acre
worth $2,794/acre



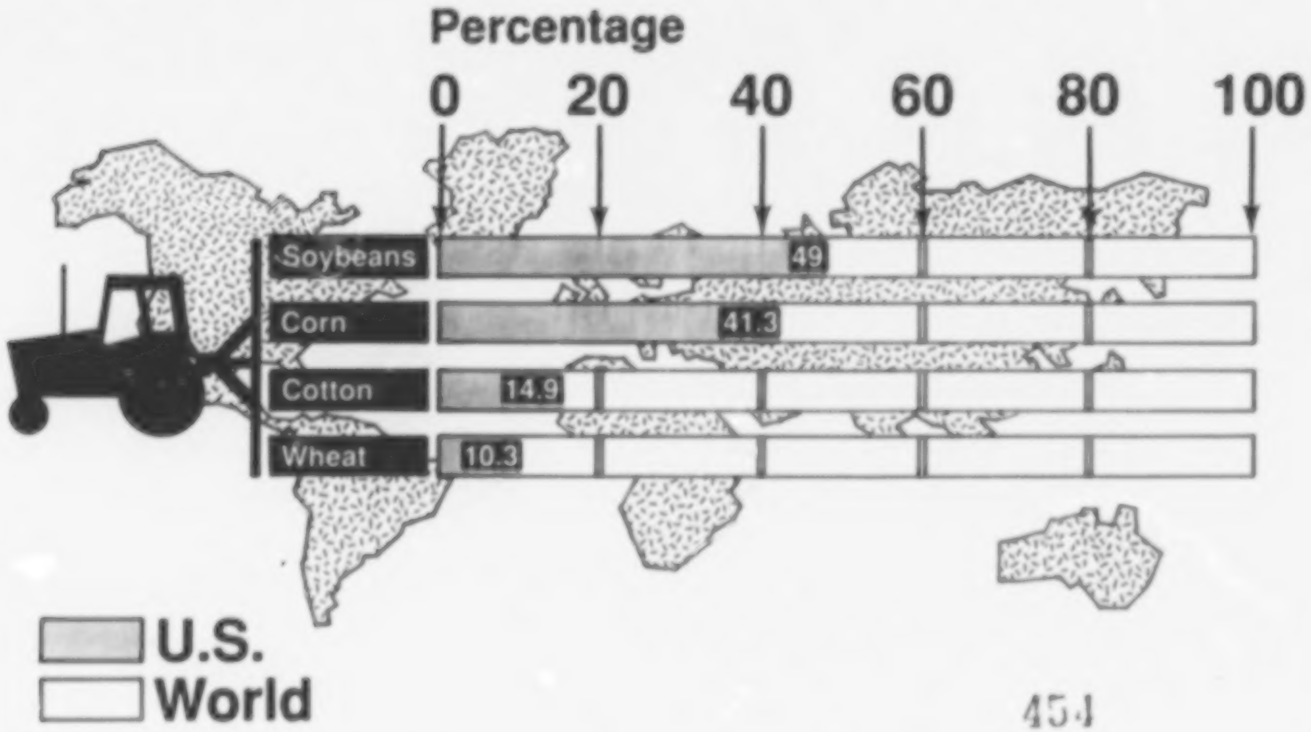
Sweet Corn
8,900 lbs./acre
worth $1,500/acre

Cotton Lint
640 lbs./acre
worth $450/acre

An acre of land is roughly the size of a football field.

Adapted with permission of American Farm Bureau Federation.

U.S. Share of World Production



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CIMC VII 39

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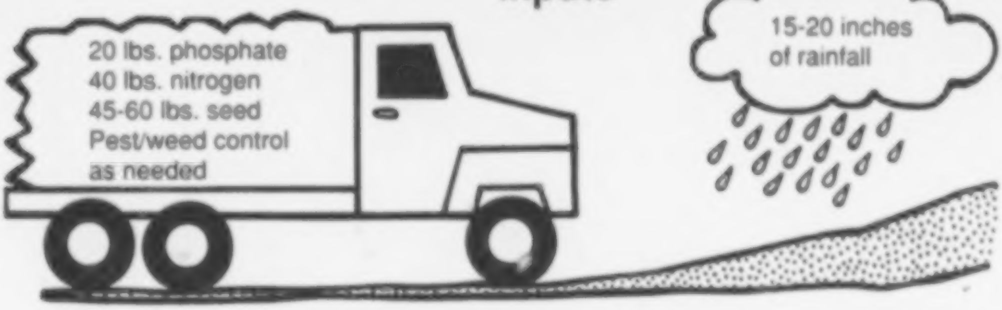
What It Takes to Grow an Acre of Wheat

(Typical Central Kansas Wheat Farm)

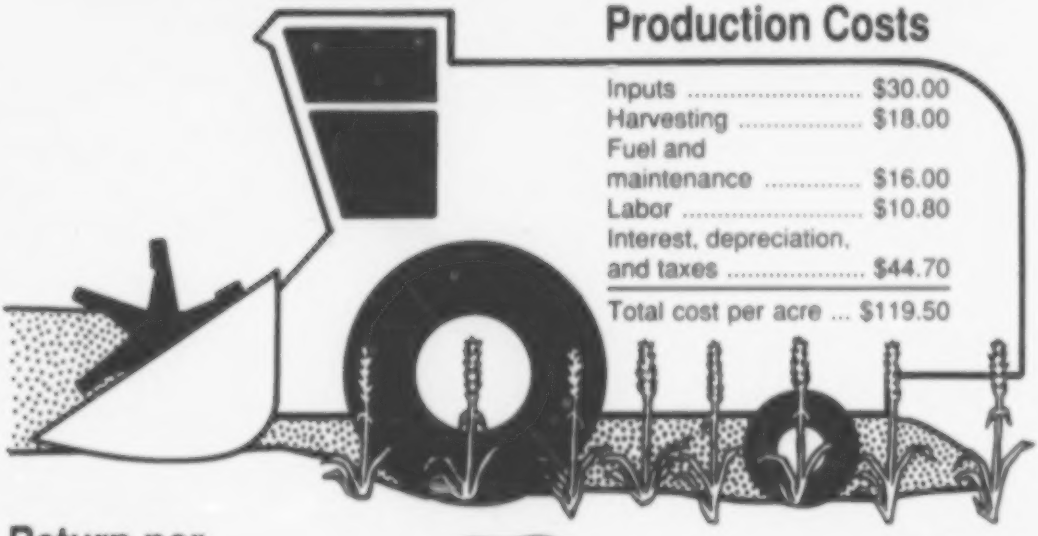
Inputs



20 lbs. phosphate
40 lbs. nitrogen
45-60 lbs. seed
Pest/weed control as needed

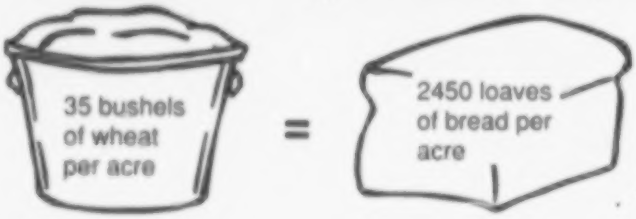
15-20 inches of rainfall

Production Costs



Inputs	$30.00
Harvesting	$18.00
Fuel and maintenance	$16.00
Labor	$10.80
Interest, depreciation, and taxes	$44.70
Total cost per acre	$119.50

Return per acre = $135.50
(Includes deficiency payments)



35 bushels of wheat per acre = 2450 loaves of bread per acre

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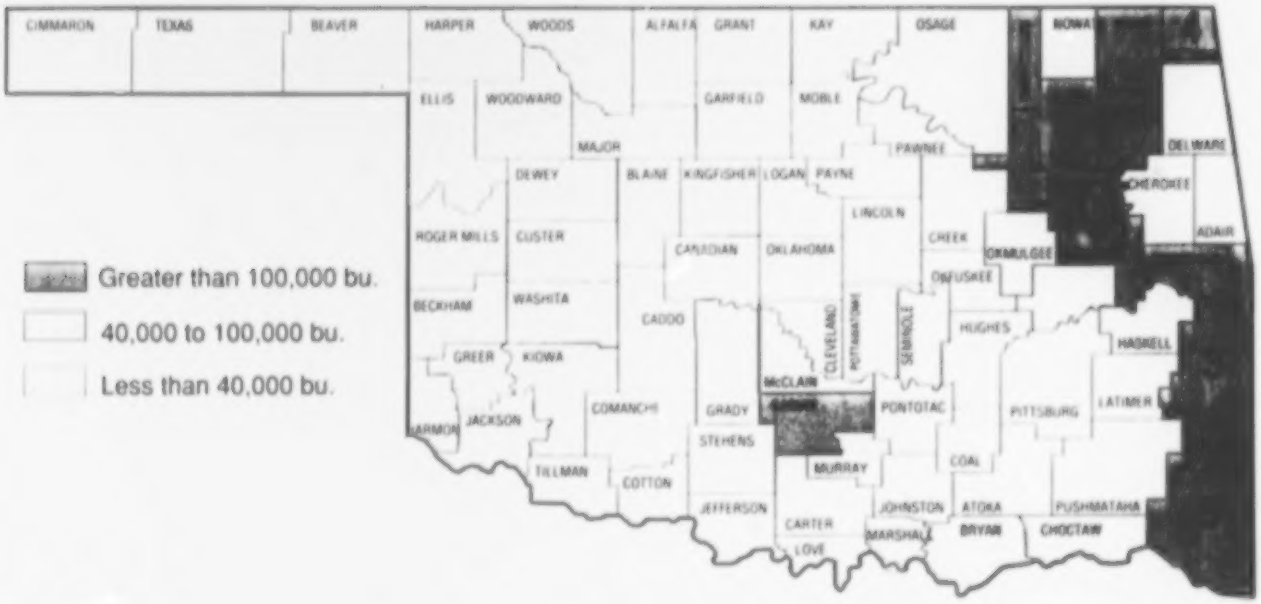
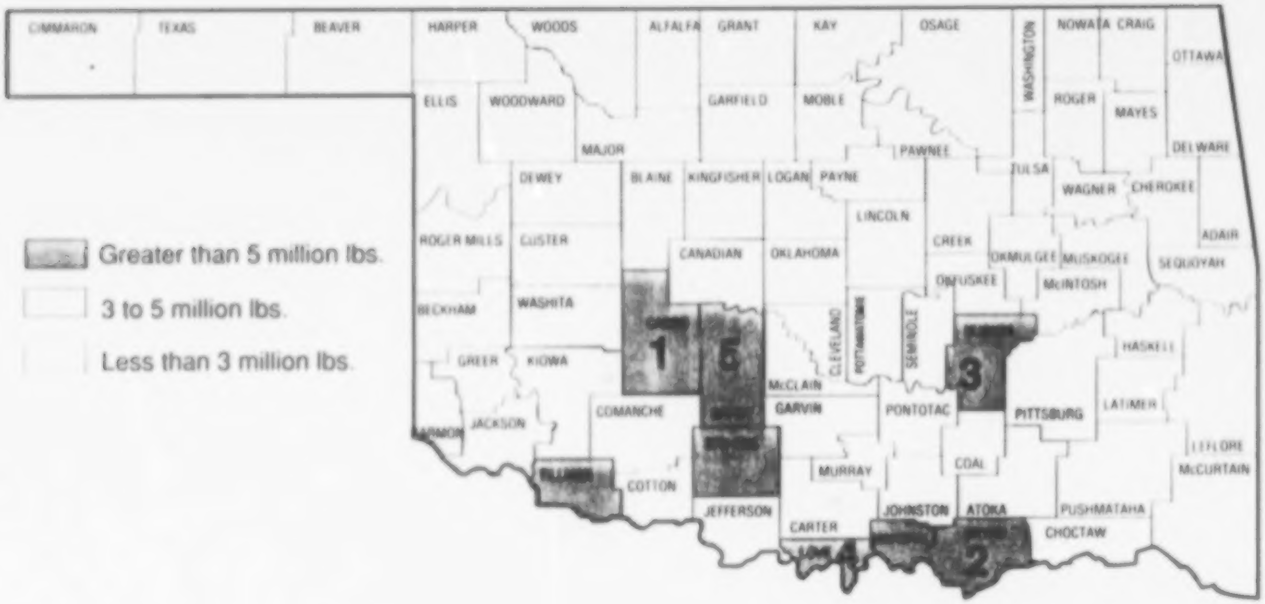
SOYBEAN PRODUCTION, OKLAHOMA, 1990


▨ Greater than 100,000 bu.
☐ 40,000 to 100,000 bu.
☐ Less than 40,000 bu.
CIMMARON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
NOWATA
ELLIS
WOODWARD
GARFIELD
NOBLE
MAJOR
PAWNEE
DELAWARE
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CHEROKEE
LINCOLN
ROGER MILLS
CUSTER
CANADIAN
OKLAHOMA
CREEK
ADAIR
OKMULGEE
OKFUSKEE
BECKHAM
WASHITA
CADDO
CLEVELAND
POTTAWATOMIE
SEMINOLE
HUGHES
HASKELL
GREER
KIOWA
McCLAIN
PONTOTAC
PITTSBURG
LATIMER
ARMON
JACKSON
COMANCHE
GRADY
STEHENS
TILLMAN
COTTON
MURRAY
COAL
JEFFERSON
JOHNSTON
ATOKA
PUSHMATAHA
CARTER
MARSHALL
BRYAN
CHOCTAW
LOVE

Courtesy of Oklahoma Department of Agriculture

All Peanut Production, Oklahoma, 1990


▨ Greater than 5 million lbs.
▭ 3 to 5 million lbs.
▭ Less than 3 million lbs.
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COAL
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COTTON
JEFFERSON
CARTER
JOHNSTON
ATOKA
PUSHMATAHA
CHOCTAW
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Courtesy of Oklahoma Department of Agriculture

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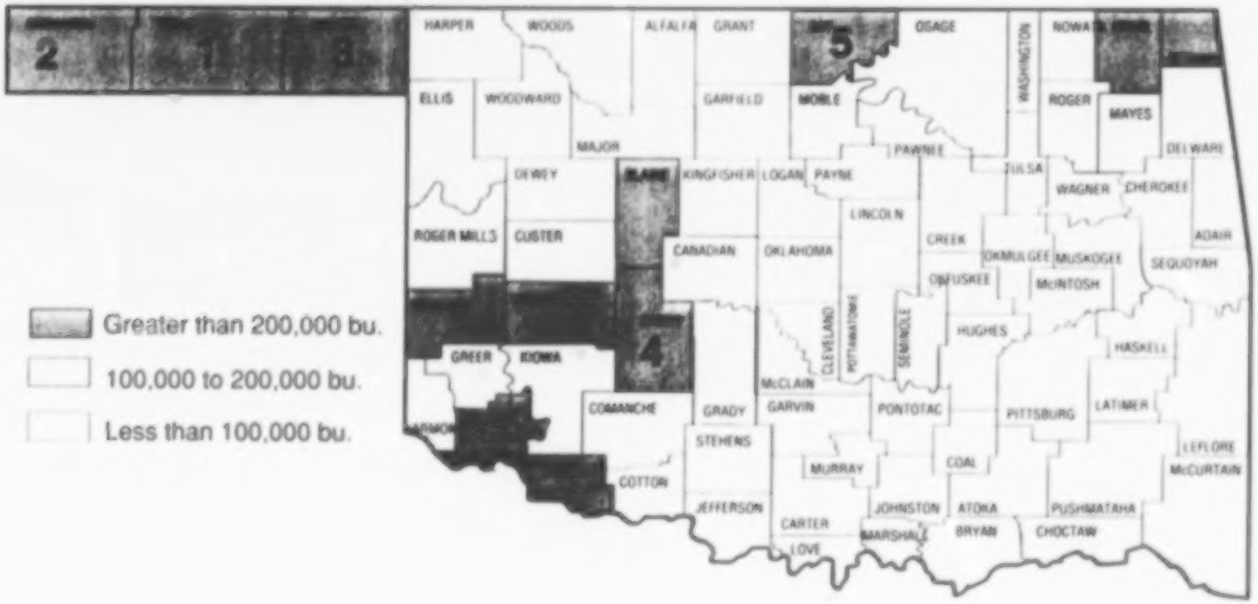
TM 7

Grain Sorghum Production, Oklahoma, 1990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COTTON
JEFFERSON
JOHNSTON
ATOKA
PUSHMATAHA
CARTER
MARSHALL
BRYAN
CHOCTAW
LOVE
▨ Greater than 200,000 bu.
☐ 100,000 to 200,000 bu.
☐ Less than 100,000 bu.

Courtesy of Oklahoma Department of Agriculture

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All Cotton Production, Oklahoma, 1990

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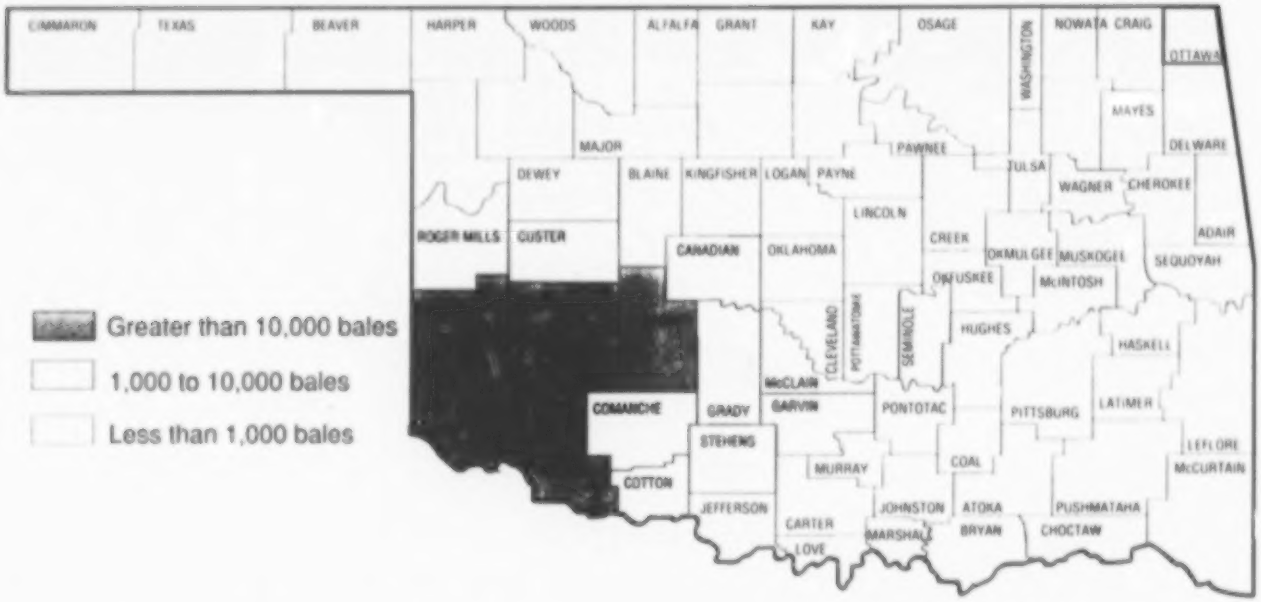
CIMC - VII - 49


Greater than 10,000 bales
1,000 to 10,000 bales
Less than 1,000 bales
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JOHNSTON
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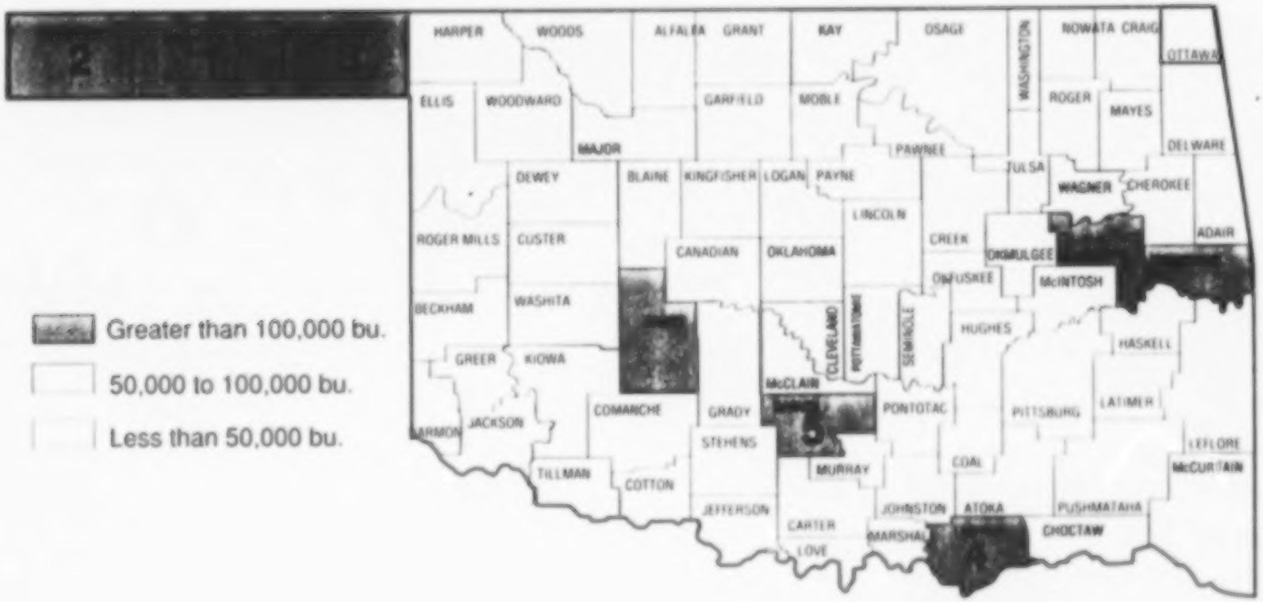
BRYAN
CHOCTAW
LOVE

Courtesy of Oklahoma Department of Agriculture

TM 9

Corn for Grain Production, Oklahoma 1990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CHOCTAW
LOVE
▨ Greater than 100,000 bu.
☐ 50,000 to 100,000 bu.
☐ Less than 50,000 bu.

Courtesy of Oklahoma Department of Agriculture

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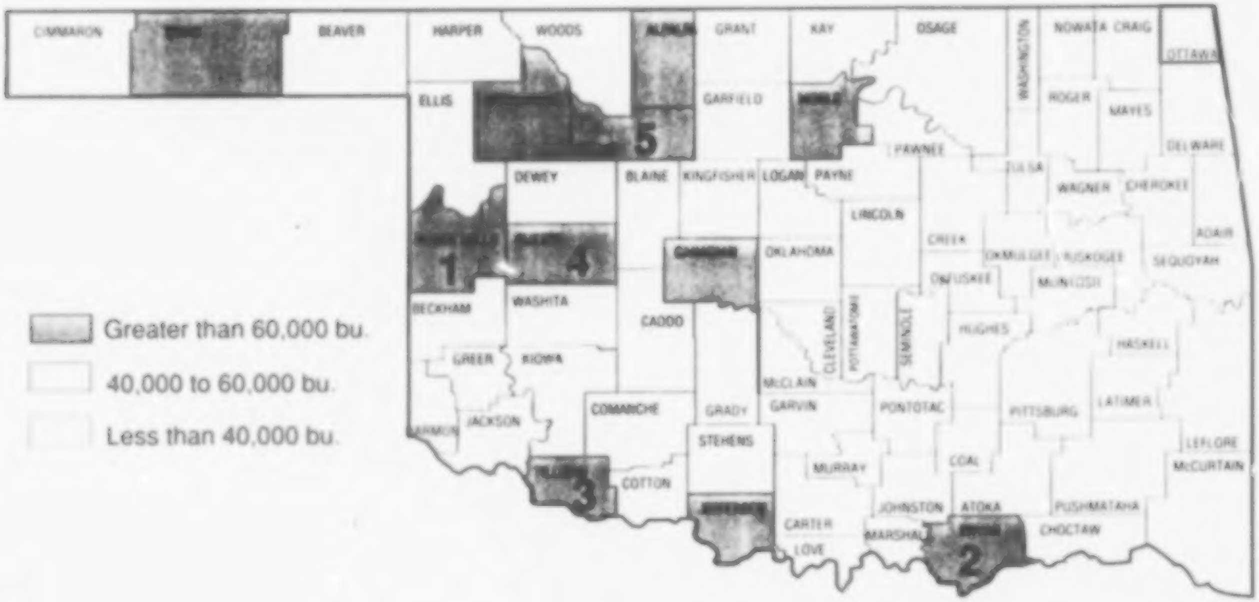
Oat Production, Oklahoma 1990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STEPHENS
LEFLORE
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COAL
MCCURTAIN
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COTTON
JOHNSTON
ATOKA
PUSHMATAHA
CARTER
CHOCTAW
LOVE
MARSHALL
2
Greater than 60,000 bu.
40,000 to 60,000 bu.
Less than 40,000 bu.

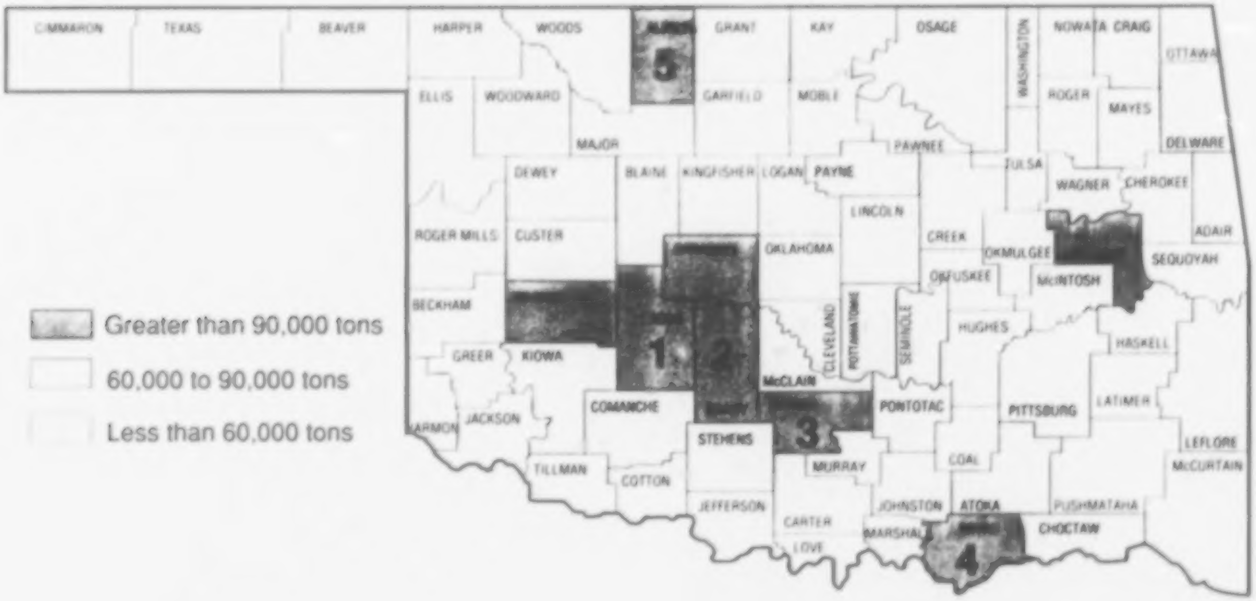
Courtesy of Oklahoma Department of Agriculture

467

466

TM 11

All Hay Production, Oklahoma 1990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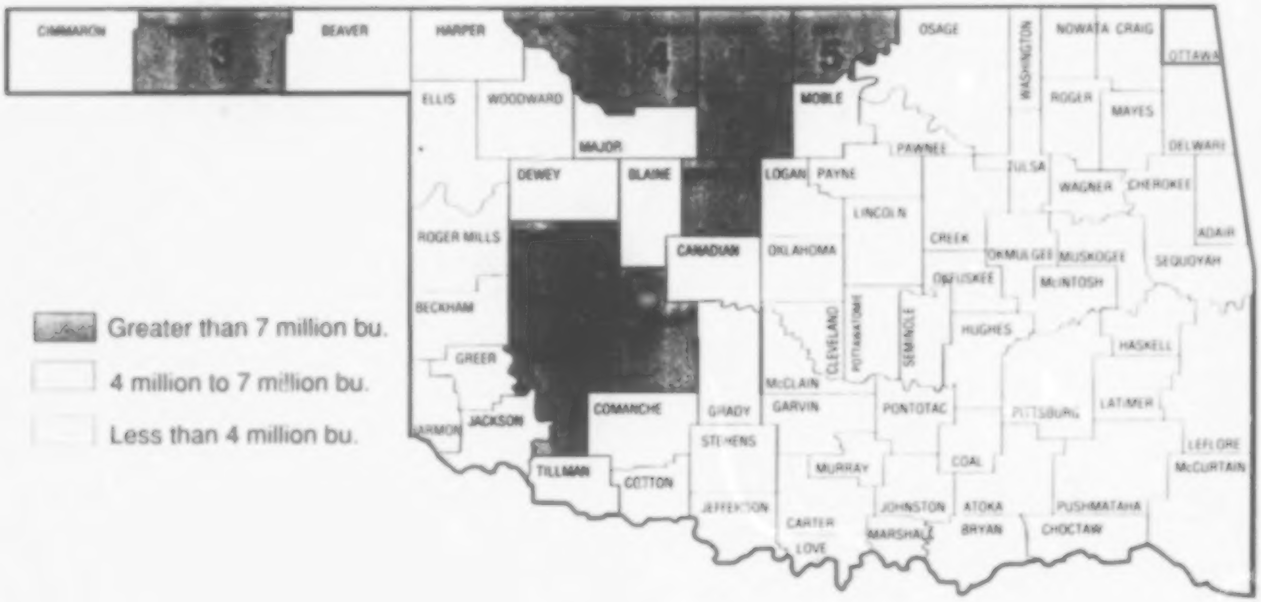
COMANCHE
PONTOTAC
PITTSBURG
LATIMER
STEPHENS
MURRAY
COAL
LEFLORE
TILLMAN
COTTON
McCURTAIN
JEFFERSON
JOHNSTON
ATOKA
PUSHMATAHA
CARTER
MARSHALL
CHOCTAW
LOVE
1
2
3
4
5
Greater than 90,000 tons
60,000 to 90,000 tons
Less than 60,000 tons

Courtesy of Oklahoma Department of Agriculture

TRANSPARENCY MASTER 12 - 8th Grade Agriculture
CIMC - VII - 55

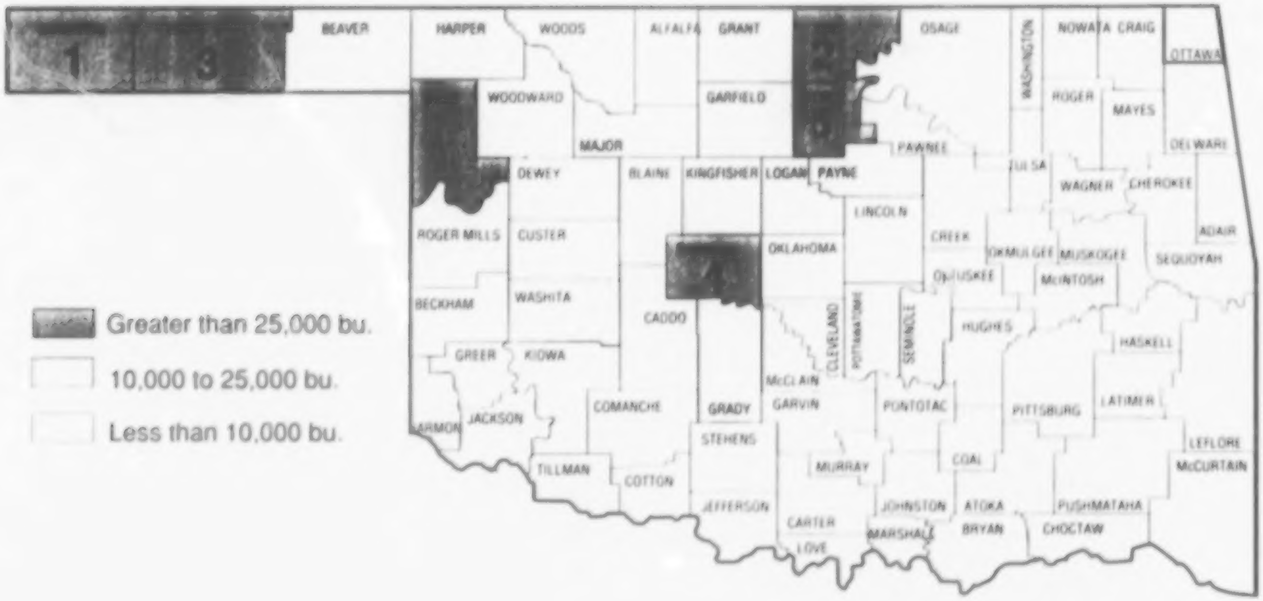
All Wheat Production, Oklahoma 1990


Greater than 7 million bu.
4 million to 7 million bu.
Less than 4 million bu.
CIMMARON
3
BEAVER
HARPER
4
5
OSAGE
WASHINGTON
NOWATA
CRAIG
OTTAWA
ELLIS
WOODWARD
NOBLE
ROGERS
MAYES
MAJOR
PAWNEE
DELAWARE
DEWEY
BLAINE
LOGAN
PAYNE
TULSA
WAGNER
CHEROKEE
LINCOLN
ROGER MILLS
CANADIAN
OKLAHOMA
CREEK
ADAIR
OKMULGEE
MUSKOGEE
SEQUOYAH
OKFUSKEE
McINTOSH
BECKHAM
CLEVELAND
POTTAWATOMIE
SEMINOLE
HUGHES
HASKELL
GREER
McCLAIN
HARMON
JACKSON
COMANCHE
GRADY
GARVIN
PONTOTAC
PITTSBURG
LATIMER
STEPHENS
LEFLORE
McCURTAIN
TILLMAN
COTTON
MURRAY
COAL
JEFFERSON
JOHNSTON
ATOKA
PUSHMATAHA
CARTER
MARSHALL
BRYAN
CHOCTAW
LOVE

Courtesy of Oklahoma Department of Agriculture

TRANSPARENCY MASTER 14 - 8th Grade Agriculture
CIMC - VII - 59

Barley Production, Oklahoma 1990


1
3
BEAVER
HARPER
WOODS
ALFALFA
GRANT
OSAGE
WASHINGTON
NOWATA
CRAIG
OTTAWA
WOODWARD
GARFIELD
ROGER
MAYES
MAJOR
PAWNEE
DELWARE
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
TULSA
WAGNER
CHEROKEE
LINCOLN
ADAIR
ROGER MILLS
CUSTER
CREEK
OKLAHOMA
OKMULGEE
MUSKOGEE
SEQUOYAH
OKFUSKEE
McINTOSH
BECKHAM
WASHITA
CADDO
CLEVELAND
POTTAWATOMIE
SEMINOLE
HUGHES
HASKELL
GREER
KIOWA
McCLAIN
HARMON
JACKSON
COMANCHE
GRADY
GARVIN
PONTOTAC
PITTSBURG
LATIMER
STEHENS
LEFLORE
McCURTAIN
TILLMAN
COTTON
MURRAY
COAL
JEFFERSON
JOHNSTON
ATOKA
PUSHMATAHA
CARTER
MARSHALL
BRYAN
CHOCTAW
LOVE

▨ Greater than 25,000 bu.

☐ 10,000 to 25,000 bu.

☐ Less than 10,000 bu.

Courtesy of Oklahoma Department of Agriculture

TM 14

ACTIVITY SHEET 1

Development of:
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why creative thinking/problem solving and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  – Applying intuitive thinking techniques

  EMPLOYABILITY SKILLS

  – Investigating employment prospects of a career field/occupation

- If students have difficulty applying intuitive thinking techniques:

  – Get students involved in sharing ideas with a creativity-enhancing exercise, such as listing all the uses for a clothespin or activities such as those recommended in a book on creativity.

  NOTE: *A Whack on the Side of the Head: How to Unlock Your Mind for Innovation* is a creativity activity book by Roger Von Oech and published by Warner Books, New York, 1983. Includes games, illustrations, exercises and self-evaluation tests.

  – Review the use of intuitive thinking techniques.

  – Practice using the thinking techniques.

- If students have difficulty investigating employment prospects of a career field/occupation:

  – Suggest they read current information on the career field.

  – Suggest they discuss the career field with a professional.

ACTIVITY SHEET 1

FIELD CROP PRODUCTION

VII

IDENTIFY THE CAREERS INVOLVED IN MANUFACTURING A PAIR OF JEANS

INTRODUCTION

How many jobs are involved making a pair of jeans? Well, begin with the farmer who grows the cotton. How many other people contribute to the field crop production? What about after the cotton is harvested? What about after it is woven into cloth? After it is shipped to a clothing store? See how many jobs you can name.

DIRECTIONS

In the spaces below write down as many jobs as you can think of that are involved in making jeans.

Cognitive Activities Skills

- Apply intuitive thinking techniques

Job Search/ Selection Skills

- Investigate employment prospects of a career field/occupation

ACTIVITY SHEET 2

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, creative thinking/problem solving, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Interpreting graphics & symbols

MATHEMATICS SKILLS

- Interpreting graphs (picture)

SCIENCE SKILLS

- Investigating physical characteristics of the earth

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Analyzing/synthesizing information
- Creating a finished product

SOCIAL STUDIES SKILLS

- Interpret graphical information
- Interpret maps/globes
- Interpret statistical information

- If students have difficulty interpreting graphics and symbols, interpreting graphical information, or interpreting picture graphs,
  - Review the structure of the chart.
  - Discuss the legend and review how to use it.
  - Create a similar graphic or illustration of information that is familiar and pertinent to them.
- If students have difficulty investigating physical characteristics of the earth, discuss the relationships among rainfall, soil types, topography and growing conditions required by specific crops.
- If students have difficulty analyzing/synthesizing information:
  - Remind them that to analyze they must break the information down into all its component parts in order to understand it.
  - Remind them that to synthesize information they should put all the component parts together in a way that makes the information usable.
- If students have difficulty interpreting maps/globes:
  - Examine and define the various components of a map.
  - Discuss the purpose of the map.
  - Discuss the types of information that can be conveyed by a map.
  - Examine the orientation, legend and scale of the map.
- If students have difficulty interpreting statistical information:
  - Discuss the type of statistics used and how they should be applied.
  - Create examples of analogous statistics using hypothetical data already familiar to them.
  - Remind them that statistics are only facts and numbers; they should consider how the statistics are interpreted and applied when forming an opinion or making a comparison.

SURVEY FIELD CROPS GROWN IN NEIGHBORING COUNTIES

DIRECTIONS

Select four counties that border your home county: one to the north, south, east, and west.

Use Transparency Masters 6-14 and other references to determine the major field crops in each of the counties.

Compare crops grown in those counties to crops grown in your county.

Make a poster illustrating the crops grown in your county and in each of the counties you surveyed.

Functional Reading Skills
- Interpret graphics & symbols

Data Analysis and Display Skills
- Interpret graphs

Earth Science Skills
- Investigate physical characteristics of the earth

Cognitive Activities Skills
- Analyze/synthesize information
- Create a finished product

Information Analysis Skills
- Interpret graphical information
- Interpret maps/globes
- Interpret statistical information

ACTIVITY SHEET 3

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, oral communication, interpersonal or relating, creative thinking/problem solving, and social studies skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Locating resources

  WRITING SKILLS

  - Using standard grammar, spelling, and capitalization
  - Stating ideas clearly
  - Proofreading & editing
  - Writing letters

  ORAL COMMUNICATION SKILLS

  - Making informative presentations
  - Using good speaking techniques
  - Selecting/using words effectively
  - Using effective body language
  - Presenting appropriate appearance

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Creating a finished product

SOCIAL STUDIES SKILLS

- Investigating/applying US geography

- If students have difficulty locating resources:
  - Discuss different ways of obtaining the information.
  - Invite a librarian to discuss available resources and how to use them.
- If students have difficulty using complete sentences, remind them to check for a subject and a verb (that is singular or plural to agree with the subject), and a predicate that completes the verb, if it is needed to complete the idea.
- If students have difficulty stating ideas clearly:
  - Suggest they have their thoughts organized before they begin writing.
  - Review the information noting the key words and ideas.
  - Discuss the importance of stating the ideas clearly.
  - Instruct them to use simple concise words.
- If students have difficulty using complete sentences, remind them to check for a subject and a verb (that is singular or plural to agree with the subject), and a predicate that follows the verb, if it is needed to complete the idea.
- If students have difficulty proofreading and editing:
  - Direct them to read slowly and carefully for meaning, punctuation, spelling, and capitalization.
  - Suggest that they take out any unneeded sentences, phrases, words, or punctuation.
  - Have them read the letter backwards to look for misspelled words.
- If students have difficulty writing letters, provide samples to learn the format and structure.
- If students have difficulty making informative presentations:
  - Remind them that being prepared is the best way to handle nerves and insure a successful presentation.

  - Encourage them to practice in front of a mirror, for their families and close friends before they make the speech in class.

  - Explain that being nervous is a natural part of making a speech. The fear will go away within 30 seconds after they start.

  - Suggest that the student who gets a dry mouth bring a glass of water to the stand.

  - Stress that the people in the audience are not critics, waiting for the speaker to make a mistake. Audiences WANT the speaker to succeed; they want the information and entertainment in a presentation.

- If students have difficulty using good speaking techniques, selecting/using words effectively, and using effective body language:

  - Suggest that they watch good speakers on television or in local assemblies or other programs.

  - Stress that students should use a natural, conversational approach.

  - Stress the importance of expressing ideas clearly, in well-organized way, with a clear beginning, middle, and end.

  - Encourage students to use good language and more specific language than in their everyday speech.

  - Stress that good preparation and practice are the most important factors in sounding and looking good.

- If students have difficulty presenting appropriate appearance, stress that they are asking others to look at them (their whole bodies) and to form an impression about what they say; and dressing appropriately is part of making that impression a good one.

- If students have difficulty investigating/applying US geography:

  - Discuss the relationships among topography and climate.

  - Encourage students to look at maps from different sources and with different features.

  - Discuss drainage and other characteristics of plains, deltas, mountain, and hill country and how natural geographic features mark state and areal divisions.

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 2.

SURVEY FIELD CROPS GROWN IN OTHER STATES

DIRECTIONS

Choose two states. Try to choose states no other student in your class has chosen.

Write the State Department of Agriculture in the states you selected. Use correct spelling, punctuation and grammar, and proofread your letters. Check with your school's librarian to obtain addresses. Ask the following questions:

- What crops are grown in the state?
- What geographic or climatic features affect agriculture in the state?
- How much of each crop is grown?
- What major changes in field crop production has the state seen?
- What is the forecast for field crop production in the state?

Share their response with your class by presenting a brief oral report or preparing a poster.

Reading Comprehension Skills
- Distinguish fact, opinion & inference

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Composition Skills
- Use complete sentences
- Proofread & edit

Functional Writing Skills
- Write letters

Oral Presentation Skills
- Make informative presentations
- Use good speaking techniques
- Select/use words effectively
- Use effective body language
- Present appropriate appearance

Cognitive Activities Skills
- Create a finished product

Social Studies Application Skills
- Investigate/apply US geography

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, oral communication, interpersonal or relating, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Locating resources

  ORAL COMMUNICATION SKILLS

  - Applying active listening skills
  - Conducting/receiving interviews
  - Communicating with professional colleagues/associates

  INTERPERSONAL OR RELATING SKILLS

  - Interacting with professional colleagues/associates

  SOCIAL STUDIES SKILLS

  - Investigating/applying principles of economics
  - Analyzing consumer issues

- If students have difficulty applying active listening skills:
  - Stress the importance of focusing on the speaker.
  - Remind students that maintaining eye contact enhances listening ability.
  - Practice concentrating on the speaker and ignoring common distractions.

  - Suggest that they be ready to listen before beginning the communication.

- If students have difficulty conducting/receiving interviews:
  - Remind them to organize their thoughts and questions before the interview begins.
  - Remind them to familiarize themselves with background information on the subject to be discussed and the person to be interviewed.
  - Review oral communication and interpersonal or relating skills.
  - Discuss with them the fact that interviewing sometimes makes students nervous. Instruct them to remember that the interview is a conversation.
  - Remind them of the importance of being a good listener.
  - Remind them not to get so intent on asking all their questions that they fail to hear all the answers.
  - Review oral communication and interpersonal or relating skills.

- If students have difficulty communicating with or interacting with professional colleagues/associates:
  - Review listening skills.
  - Review questioning techniques.
  - Remind them that professional colleagues/associates are one of the best sources of information.
  - Discuss with them the fact that interviewing sometimes makes students nervous. Instruct them to remember that the interview is a conversation.
  - Remind them of the importance of being a good listener.
  - Remind them not to get so intent on asking all their questions that they fail to hear all the answers.

- If students have difficulty investigating/applying principles of economics:
  - Discuss the importance of understanding world economics.
  - Discuss the ways the economy of a nation impacts the economy of another country.
  - Discuss the ways that the economy of a country impacts world economics.
  - Review the terms related to the economy;

    EXAMPLE: Import, export, gross national product, trade balance, etc.
  - Discuss the importance of maintaining a healthy economy.
- If students have difficulty analyzing consumer issues:
  - Define consumer issues.

    EXAMPLE: Issues or situations related to products or services bought and used by individuals, such as crops used for food or clothing.
  - Discuss how crops grown locally affect the standard of living.
  - Discuss choices or options that the consumer has about the quality, effectiveness, price, and availability of the products being considered.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 3.

ASSIGNMENT SHEET 1

FIELD CROP PRODUCTION

VII

Name ______________________________ Score __________

OBJECTIVE 6

Survey local crops.

INTRODUCTION

No matter where you live, field crops are part of your local economy. Even New York City contains a farm within its city limits. Where you live will determine what crops are grown in your area. You may know some of the area crops, but you may also be surprised at what you discover.

DIRECTIONS

Survey local newspapers, interview your county extension agent, or contact local officials to find the answers to the questions below.

Research and Reference Skills
- Locate resources

Listening Skills
- Apply active listening skills

Interactive Communication skills
- Conduct/receive interviews
- Communicate with professional colleagues/associates

General Relating Skills
- Interact with professional colleagues/associates

1. What are three crops grown in your area?

____

____

____

2. What effect do these crops have on your local economy?

____

____

____

3. List three local businesses that benefit from the local field crop industries.

____

____

____

Social Studies Application Skills

- Investigate/apply principles of economics

Functional Social Studies Skills

- Analyze consumer issues

ASSIGNMENT SHEET 2

Development of:
READING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, science, creative thinking/problem solving, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Selecting useful resources
- Locating resources
- Finding materials in library
- Using standard references

SCIENCE SKILLS

- Investigating physical characteristics of the earth
- Investigating physical forces acting on the earth

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Collecting/recording information
- Analyzing/synthesizing information
- Drawing conclusions
- Applying intuitive thinking techniques

SOCIAL STUDIES

- Interpreting maps/globes
- Investigating/applying world geography

- If students have difficulty selecting useful resources:
  - Discuss various resources they could use.
  - Discuss the type of information needed.

    EXAMPLE: Definitions, dates, instructions, historical facts, names
  - Suggest a general information resource such as an encyclopedia or the card catalog as a starting point.
  - Review basic library skills.
- If students have difficulty finding materials in library:
  - Discuss the type of cataloging system in use.
  - Demonstrate the use of the cataloging system.
  - Instruct them to practice the use of the cataloging system.
  - Discuss the arrangement of the library.
  - Discuss the importance of being skilled in the use of the library.
  - Remind them that librarians are available to assist them.
- If students have difficulty in using standard references:
  - Locate and explain the purpose of the reference section of the library.
  - Discuss the fact that each standard reference provides a specific type of information.
  - Discuss what kind of information the students need to find.
  - Review the use of in-book reference tools.
  - Discuss the importance of being able to use standard references.
- If students have difficulty investigating physical characteristics of the earth, discuss elevation and nearness to water and their effects on crop production.

- If students have difficulty investigating physical forces acting on the earth:
    - Discuss how weather patterns affect crop selection and production.
    - Use the rainfall pattern for Oklahoma as an example of crop selection and moisture levels.
- If students have difficulty collecting/recording information:
    - Review the procedures for using a map or globe.
    - Discuss the types of information that can be found in an encyclopedia, almanac, or the specific references they may be using.
- If students have difficulty analyzing/synthesizing information:
    - Remind them that to analyze they must break the information down into all its component parts in order to understand it.
    - Remind them that to synthesize information they should put all the component parts together in a way that makes the information usable.
- If students have difficulty drawing conclusions direct them to examine the collected data and look for patterns, the range of ideas expressed, the language used, the pictures or illustrations that accompany the information and what they are trying to get the reader to believe.
- If students have difficulty interpreting maps/globes:
    - Examine and define the various components of a map.
    - Discuss the purpose of the map.
    - Discuss the types of information that can be conveyed by a map.
    - Examine the orientation, legend and scale of the map.
- If students have difficulty investigating/applying world geography:
    - Discuss the importance of knowing about other countries.
    - Discuss the impact other countries have on the United States.

  - Discuss the impact the United States has on other countries.

  - Discuss the ways that a country's location can affect its economy, welfare, defense, etc.

  - Discuss ways geography affects history.

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1-4.

ASSIGNMENT SHEET 2 — FIELD CROP PRODUCTION — VII

Name ______________________________ Score ____________

OBJECTIVE 7

Compare local field crops to those grown in other countries with similar climates.

INTRODUCTION

Climate is probably the most important factor in choosing a crop. But culture is almost as important. In this assignment sheet, you will see that nations with very similar climates may grow very different crops.

DIRECTIONS

1. Use a globe or world map to find a country with a climate similar to your state's. Look at distance from the equator, elevation, and nearness to water to determine similarities. Write the name of the country below.

   ____

   ____

   ____

2. Look the country up in an encyclopedia, almanac, or other reference. What are three crops that grow in the country?

   ____

   ____

   ____

3. How are the crops grown there similar to or different from crops grown in your area?

   ____

   ____

   ____

Research and Reference Skills

- Select useful resources
- Locate resources
- Find materials in library
- Use standard references

Earth Science Skills

- Investigate physical characteristics of the earth
- Investigate physical forces acting on the earth

Cognitive Activities Skills

- Collect/record information
- Analyze/synthesize information
- Draw conclusions
- Apply intuitive thinking techniques

Information Analysis Skills

- Interpret maps/globes

Social Studies Application Skills

- Investigate/apply world geography

4. Why do you think the crops are similar or different?

____

____

____

____

ASSIGNMENT SHEET 3

Development of:
READING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, science, creative thinking/problem solving, and social studies skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Selecting useful resources
  - Locating resources
  - Finding materials in library
  - Using standard references

  SCIENCE SKILLS

  - Investigating conservation of living resources

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Collecting/recording information
  - Analyzing/synthesizing information
  - Drawing conclusions
  - Applying intuitive thinking techniques

  SOCIAL STUDIES

  - Interpreting maps/globes
  - Investigating/applying world geography

435

- If students have difficulty investigating conservation of living resources:
  - Invite discussion of current issues.
  - Assign readings in current related topics.
  - Define "living resources" and discuss which living resources are part of this assignment.
  - Discuss the importance of conserving living resources.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1-5.

ASSIGNMENT SHEET 3

FIELD CROP PRODUCTION

VII

Name ______________________________ Score ____________

OBJECTIVE 8

Chart field crop growth on a world map.

INTRODUCTION

Field crop production has been an important industry for every nation in history. Today, crops are imported and exported. They can be shipped immediately after harvest anywhere in the world. The foods you eat may not be grown anywhere in America. The crops growing near your home may be consumed by people halfway around the world. In this Assignment Sheet, you will see the variety of field crops grown in the world, and the most frequently grown crops.

DIRECTIONS

Choose six nations anywhere in the world. At least three continents must be represented. Then use an encyclopedia, world almanac, or other resource to determine their major field crops. Write the name of the country and it's crops below.

Country ______________________________

Crops ______________________________

____

____

____

____

Country ______________________________

Crops ______________________________

____

____

____

____

Research and Reference Skills

- Select useful resources
- Locate resources
- Find materials in library
- Use standard references

Earth Science Skills

- Investigate conservation of living resources

Cognitive Activities Skills

- Collect/record information
- Analyze/synthesize information
- Draw conclusions
- Apply intuitive thinking techniques

Information Analysis Skills

- Interpret maps/globes

Social Studies Application Skills

- Investigate/apply world geography

Country ____________________

Crops ____________________

____

____

____

____

Country ____________________

Crops ____________________

____

____

____

____

Country ____________________

Crops ____________________

____

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____

Country ____________________

Crops ____________________

____

____

____

____

ASSIGNMENT ANSWERS — FIELD CROP PRODUCTION — VII

ASSIGNMENT SHEETS 1, 2, & 3

Answers to all Assignment Sheets should be consistent and show the research required for correct answers.

WRITTEN TEST

FIELD CROP PRODUCTION

VII

Name ______________________________ Score __________

OBJECTIVE 1

Match terms associated with field crop production to their definitions. Write the correct letter in the blank.

_____ 1. Distributing seed, fertilizer, or pesticide over a designated area

_____ 2. A plant that is not desired and will use nutrients, space, and water intended for the crop

_____ 3. Plants grown on a large plot of land, measured in acres

_____ 4. A substance that adds nutrients to the soil

_____ 5. A substance used to control fungi

_____ 6. A substance used to control insects

_____ 7. A substance used to control weeds

_____ 8. Farming techniques designed for maximum conservation of soil and other resources

_____ 9. The science of soil management and crop production

_____ 10. To prepare the soil for planting

_____ 11. A parcel of land containing 4,840 square yards or 43,560 square feet

a. acre

b. agriculture

c. agronomy

d. application

e. defoliant

f. fertilizer

g. field crops

h. fungi

i. fungicide

j. herbicide

k. insecticide

l. organic gardening

m. perennial

n. plowing

o. sustainable agriculture

p. till

q. weed

May be photocopied for student use.

OBJECTIVE 2

Choose the word or phrase that completes statements about what is needed to produce field crops. Write the correct letter in the blank.

_____ 1. Location concerns include soil suitability, useable slope, amount of wind, and

- a. distance to town
- b. elevation
- c. proper growing season length
- d. all of the above

_____ 2. You must also look for suitable average temperature and temperature

- a. maximums
- b. minimums
- c. during the summer
- d. extremes

_____ 3. Location should include protection from

- a. water
- b. erosion
- c. traffic
- d. theft

_____ 4. Water concerns include accessibility to water for irrigation, adequate average rainfall, water table depth, and suitable

- a. drainage
- b. irrigation systems
- c. storm drainage
- d. purification

_____ 5. Marketing and transportation concerns include access, storage facilities, and

- a. holding pens
- b. vehicles owned
- c. road surfacing
- d. processing facilities

May be photocopied for student use.

_____ 6. Fences, storage buildings, and storage and protection for tools and vehicles are examples of

a. marketing requirements
b. temporary concerns
c. structures
d. pest control requirements

OBJECTIVE 3 **Select from a list true statements about fertilizers and pest control.** Write an "X" in the blank before each true statement.

_____ 1. Just as humans need certain vitamins and minerals, plants need certain nutrients, especially nitrogen, phosphorus, and potassium.

_____ 2. Phosphorus is usually applied when the crop is planted.

_____ 3. Fertilizers are never added when seeds are planted.

_____ 4. Phosphorus does not move through the soil, so it is deposited next to the seed or sprayed on the roots of seedlings.

_____ 5. Nitrogen moves through the soil, so it is deposited next to the seed or sprayed on the roots of seedlings.

_____ 6. Nitrogen does move through the soil and can be applied to the soil before or during seeding, or spread over the plants when they start to grow.

_____ 7. For fertilizing to be most beneficial, the soil must be tested.

_____ 8. Only insects are considered pests.

_____ 9. Soil testing can be performed by private laboratories, at government or university extension labs, or by fertilizer salespeople and distributors.

_____ 10. There are three basic types of pests: insects, fungi, and weeds.

_____ 11. "Working the soil" left soil exposed and moisture was lost.

May be photocopied for student use.

_____ 12. Testing is a good idea, but really has nothing to do with fertilizing.

_____ 13. Low-till or no-till farming conserves water and soil and reduces fuel costs.

_____ 14. Rotating crops to prevent a build-up of pests is a good alternative to using pesticides.

_____ 15. Chemicals are available in dry, liquid, and gaseous forms.

_____ 16. Pesticides can be deposited several ways, but fertilizers are always broadcast from tractors or airplanes.

_____ 17. The major benefit of no-till farming is fuel conservation.

_____ 18. Rotating crops helps fertilize soil, but has no effect of pest control.

_____ 19. Chemicals can be deposited with the seeds, applied to the soil when it is tilled, or sprayed on the soil or plants.

_____ 20. Chemicals are available in dry and liquid forms only.

_____ 21. Chemicals must be handled with care and manufacturer's directions must be followed at all times or serious injury can result.

_____ 22. Fertilizer labeled 10-20-10 is 50 percent carrier.

OBJECTIVE 4

Distinguish between characteristics of independent and corporate farming. Write a "C" in the blanks before characteristics of corporate farms and an "I" in the blanks before characteristics of independent farms.

_____ 1. Important to American history for decades

_____ 2. Done increasingly today

_____ 3. Managed by a board of directors or hired farm manager

_____ 4. More likely to raise a single crop

May be photocopied for student use.

_____ 5. More likely to diversify

_____ 6. Usually larger

_____ 7. Protection and conservation of the land is often more important

_____ 8. May be more concerned with meeting production goals

OBJECTIVE 5

List factors affecting choice of crop. List two factors and an example of each one.

1. ____

____

2. ____

____

NOTE: Objectives 6 - 8 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

FIELD CROP PRODUCTION

VII

OBJECTIVE 1

1.	d	7.	j
2.	q	8.	o
3.	g	9.	c
4.	f	10.	p
5.	i	11.	a
6.	k		

OBJECTIVE 2

1.	c	6.	c
2.	d		
3.	b		
4.	a		
5.	d		

OBJECTIVE 3

1, 2, 4, 6, 7, 9, 10, 11, 13, 14, 15, 19, 21

OBJECTIVE 4

1.	I	6.	C
2.	C	7.	I
3.	C	8.	C
4.	C		
5.	I		

OBJECTIVE 5

Answers should include any two of these categories and an example of each. Alternate categories or examples presented in class are also acceptable.

Location
- Growing season
- Soil
- Access to water
- Water table depth

Marketability
- Profitability
- Popularity

Goals of the operation
- Crop rotation
- Crop diversity
- Operating needs

Availability of suitable varieties

OBJECTIVE SHEET

ANIMAL PRODUCTION

VIII

INTRODUCTION

Man has always used animal products. Prehistoric man used the bones, hides, horns, meats, and fats to keep himself safe, warm, and fed. As man progressed, use of animal products changed, but remained a vital influence on everyday life. Think of the animal products that have been a part of history: Vikings wore horned helmets to show their strength, Zulu warriors fought with hide-covered shields, Spaniards showed their bravery through bullfighting, Native Americans used feathers to show their virtue and decorate themselves during holy dances. The use of animals allowed man to travel, explore, build, and conquer.

Today, we use animal products more than ever. We still use them for food, clothing, and recreation, but there are many other uses you might not even be aware of. Medicines, paints and varnishes, plastics, and detergents are just a few of the many products derived from animals.

This reliance on animals makes animal production an important industry, both domestically and internationally.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify terms associated with animal production, traditional and non-traditional animal products, what is necessary to raise animals, and factors affecting breed choice. The student will also be able to use basic restraint holds on calves, sheep, and pigs. The student will demonstrate these competencies by completing assignment sheets, job sheets, practical tests, and a written test with 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with animal production to their definitions.
2. Select from a list true statements about the overall process of raising livestock.
3. List assets and activities needed to manage a livestock operation.
4. Discuss U.S. and worldwide livestock.
5. List factors affecting choice of breed.

6. Choose the word or phrase that completes statements about new meat technologies.
7. Give a report on trends in animal production. (Assignment Sheet 1)
8. Compare trends in animal production. (Assignment Sheet 2)
9. Identify breeds of livestock. (Assignment Sheet 3)
10. Use flank casting and castration restraint on cattle. (Job Sheet 1)
11. Use vaccination or castration restraint on small pigs. (Job Sheet 2)
12. Use castration and docking restraint on small sheep. (Job Sheet 3)

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Speakers might include local ranchers, veterinarians, livestock judges, livestock auctioneers, or your local county extension agent. Supply speakers with specific objectives and other appropriate sections of the unit.

- Make arrangements for students to visit state or county fairs or livestock shows in your area.

- Make arrangements for a local veterinarian to demonstrate basic procedures such as dehorning, docking, debeaking, castration, or implants.

- Make arrangements for any audiovisual equipment that will be needed for this unit.

- Arrange to have all materials, supplies, and equipment necessary to complete job sheets.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with animal production to their definitions.

- The terms listed are very basic and may need to be replaced or expanded if your students have agricultural backgrounds.
- Add terms introduced by guest speakers or during classroom activities.
- Have students use proper terms during class. "Cow," for example, should only be used describing a female bovine.
- Use Student Supplements 1, 2, 3, and 4 and Transparency Masters to expand vocabulary and provide basic information about the animal production industry.
- Discuss the brucellosis rating in your state. (See Student Supplement 1 for more information on brucellosis.)

Objective 2: Select from a list true statements about the overall process of raising livestock.

Objective 3: List assets and activities needed to manage a livestock operation.

- Use Student Supplements 5, 6, and 7 for more information on animal production.
- Have students complete Job Sheets 1-3.
- This objective strives to describe the breadth of the field. Add to this information as many details as you feel your students are ready for. Details on feeding, care, and disease control are not included here.
- Focus on animal production industries in your area. Have students discuss how the industry affects your city by listing all the jobs they can think of that are affected by it.
- Provide the most recent statistics on what the animal production industry earned in your area and nationally.
- Allow students to visit a local animal production industry. Make them aware of the major species and breeds being raised and the major steps in raising the animals.
- Draw parallels between animal production and crop production, where possible.
- Show former students' record books to illustrate record keeping and the number of decisions that must be made concerning animal production.

Objective 4: Discuss U.S. and worldwide livestock.

- Use Student Supplement 8 to discuss non-traditional animal products and foods.
- Have students complete Activity Sheet 1.
- Have students list as many exotic meats as they can think of. Put a star by each meat someone in the class has eaten.
- Have students discuss how culture has affected which animal products are used. For example, we find a lot of beef in the United States, but very little in India, where Hindu people revere cows or in Japan where land is scarce.
- Have students discuss what animal products will most likely be used in the future. Have them discuss what animal products will most likely be used in the following settings: space travel and colonization; undersea colonization; nations affected by overpopulation.
- Invite a local cook or your school's home economics teacher to discuss non-traditional foods and perhaps prepare some.

Objective 5: List factors affecting choice of breed.

- Have students complete Assignment Sheets 1 and 2.
- Have students discuss why each factor is important.
- Have students consider a non-traditional product such as ostriches and try to answer each question.
- Discuss new technologies and how breeds might be changed to make them more profitable.

Objective 6: Choose the word or phrase that completes statements about new meat technologies.

- Compare new technologies to cross-breeding and show students that the goals of both are the same.
- Have students identify designer meats they find in their local supermarket or in local restaurants.
- Display lists of animal by-products. Add to the lists whenever possible.
- Collect newspaper and magazine articles that discuss new technologies, theories, or experiments.

APPLICATION

Objective 7: Give a report on trends in animal production.

Objective 8: Compare trends in animal production.

- Describe the oral reports students will be asked to give in FFA, 4-H, and high school classes.
- Invite a local Toastmaster club member or your high school public speaking teacher to give your students some helpful hints.
- Use the speech evaluation sheet in Unit V to evaluate students.
- Discuss trends that students are familiar with and draw parallels to agriculture.
- Tell students they will be giving another oral report in a later unit. Use this assignment sheet to introduce them to the procedure and help them overcome their nervousness.
- Announce information on public speaking competitions. Base your time limit and other specifications on those competitions.
- Take your class to your school library and allow them time to do their research. Encourage them to used as many resources and references as possible.
- Invite your school or local librarian to discuss research tools available at public libraries.
- Invite a statistician or market analyst to discuss what trends are, how they are tracked and predicted, and why different people can cite different trends based on the same information.

Objective 9: Identify breeds of livestock.

- Show slides of livestock breeds.

  NOTE: See Suggested Resources.
- Make slides and script set available for students to study on their own.
- Focus discussion on breeds commonly found in your area.

Objective 10: Use flank casting and castration restraint on cattle.

Objective 11: Use vaccination or castration restraint on small pigs.

Objective 12: Use castration and docking restraint on small sheep.

- Discuss safety rules and procedures.
- Demonstrate each hold and discuss when it is used.
- Have students watch westerns and see if proper techniques are used.
- Invite a local rancher to demonstrate each hold and discuss why they are used.
- Allow students to see restraining equipment in use.
- Discuss other methods of castration and restraint.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Practical tests

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical tests.
- Describe the rating scale used on the practical tests.
- Give practical tests.
- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Biotechnology–A Science Tool for the Future.* Ohio Cultural Education Curriculum Material Service, 2120 Fyffe Road, Columbus, OH 43210. Presents biotechnology as a tool to improve animal production. Genetic engineering, DNA technology, embryo transfer, and tissue culture are covered. (13 minutes, color, VHS)
- *Livestock Breeds.* Curriculum and Instructional Materials Center, 1500 W. Seventh Ave., Stillwater, OK 74074-4364. (Slides and script)
- Oklahoma State University Cooperative Extension Service and Agricultural Experiment Station. Offers a wide variety of films relating to animal production. For a current listing of films available, contact your county extension agent.
- *Preserving Our Livestock Heritage.* American Minor Breeds Conservancy, P. O. Box 477, Pittsboro, NC 27312. Covers the importance of various livestock breeds. (15 minutes, slide show with script)
- *Ranching.* Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112. Covers the evolution and demands of cattle and sheep ranching. (10 minute, color, VHS)
- *Today's Veterinarian.* Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709. Discusses the work of veterinarians in various settings. Available for free loan. (22 minutes, color, VHS or 16 mm film)

- *The World of the U.S. Holstein.* Venard Films, P. O. Box 1332, Peoria, IL 61654. Discusses the importance of Holsteins and management programs. Available for free loan. (Color, VHS, or 16 mm film)

Print Media

- *American Minor Breeds Notebook.* American Minor Breeds Conservancy, P. O. Box 477, Pittsboro, NC 27312. 71 pages containing information and photographs of 68 rare breeds of cattle, goats, horses, pigs, and sheep.

- Belleville, Cheryl Walsh. *Round-up.* Features photographs of a traditional spring round-up, including branding, inoculation, dehorning, and castration.

- Belleville, Rod and Cheryl Walsh Belleville. *Stockyards.* Describes stockyards and livestock auctions.

- *Cattle Trails in the 1870's.* Kansas Foundation for Agriculture in the Classroom, Bluemont 124, Kansas State University, Manhattan, KS 66506. A 47-page unit with bulletin board displays that features information about the Chisholm Trail and other cattle trails, herds, and cattle owners and related math problems.

- Fenton, Carroll Lane and Herminie B. Kitchen. *Animals That Help Us: The Story of Domestic Animals.* Contains historical and biological information on domesticated animals, including non-traditional species such as reindeer and new technology information. Available through your local library or bookstore.

- Gibbons, Gail. *The Milk Makers.* Describes how cows produce milk and how milk is processed.

- Lavine, Sigmund A. *Wonders of Sheep.* Describes sheep breeds, history, characteristics, economic aspects, care, and folklore.

- *North American Livestock Census.* American Minor Breeds Conservancy, P. O. Box 477, Pittsboro, NC 23712. 34 page booklet. Lists information about North American breeds, charts, and breed association addresses.

- The Oklahoma State University Cooperative Extension Service and Agricultural Experiment Station offer a wide range of publications relating to animal production. For a current listing of available publications, contact your county extension agent.

- Patent, Dorothy Hinshaw and William Munoz. *The Sheep Book.* Includes information on sheep care and breeds.

- Patterson-Deutsch, Geoffrey. *Dairy Farming.* Features information on the history of dairy farming, dairy processing, machines, and breeds.
- Scott, Jack Denton. *The Book of the Pig.* Covers the history, behavior, production procedures, and usefulness of pigs and hogs. Available through your local library or bookstore.
- *Wool Grades and the Sheep That Grow the Wool.* American Wool Council, 6911 South Yosemite, Dept. C-689, Englewood, CO 80112. Full-color poster that describes wool grading systems and common breeds.
- Wolf, Bernard. *Cowboy.* Uses photographs and text to describe cattle ranching in Montana.

UNIT REFERENCES

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- Freeman, David W. and Don R. Topliff. *Managing Young Horses For Sound Growth.* Oklahoma State University Cooperative Extension Service: Stillwater, OK.
- Gillespie, James R. *Modern Livestock and Poultry Production.* Delmar Publishers, Inc.: Albany, NY, 1992.
- Henry, George A. Professor, Oklahoma State University, Diplomate, ACVS. Interview, September, 1991.
- Pierce, Greg. *Agricultural Livestock Skills.* Oklahoma Department of Vocational and Technical Education: Stillwater, OK, 1979.
- *Oklahoma Agriculture Profile.* Oklahoma Dept. of Agriculture: Oklahoma City, 1990.
- Thedford, Thomas R., Bill Crutcher, and Joe Hughes. *A Planning Calendar for Sheep Herd Health and Management.* Oklahoma State University Cooperative Extension Service: Stillwater, OK.

- Thedford, Thomas R., Keith Lusby, Lawrence Rice, Charles McPeak, Dale Rollins, Bruce Peverly, Kent Baines, Chuck Strasia, Frank Bates, Steve Smith, Melford Scott, and Kenneth Apple. *Beef Cow Herd Calendar.* Oklahoma State University Cooperative Extension Service: Stillwater, OK.
- United States Department of Agriculture, *Americans in Agriculture; Portraits of Diversity; 1990 Yearbook of Agriculture.*
- -----, *Characteristics of Agriculture in the United States.*

INFORMATION SHEET

ANIMAL PRODUCTION VIII

OBJECTIVE 1

Match terms associated with animal production to their definitions.

- **balanced ration** – feed that contains all the necessary nutrients to meet the animal's requirements for a 24-hour period
- **barrows** – male swine that are castrated before maturity
- **boars** – male swine that are not castrated
- **bovine** – pertaining to cattle
- **bullock** – male cattle castrated after maturity
- **bulls** – male cattle that are not castrated
- **calves** – cattle less than one year old
- **capital** – financial resources
- **castration** – removal of testicles to prevent reproduction
- **conformation** – the amount of muscle and physical structure of an animal
- **cows** – mature female cattle
- **crossbreeding** – mating animals of different breeds
- **culling** – identifying inferior animals and removing them from the herd
- **equine** – pertaining to horses
- **ewes** – female sheep
- **farrowing** – swine giving birth
- **feeder animals** – animals put on feed for increased growth
- **finish** – the amount of fat on an animal
- **gilts** – female swine that have not produced offspring
- **heifers** – female cattle that have not produced offspring

- **lambs** – sheep less than one year old
- **livestock** – animals that are managed and used for the benefit of man

  NOTE: "Animals" includes insects such as honey bees and ladybugs, as well as chickens, fish, cattle, etc.
- **pedigree** – the history of an animal's parents and previous generations
- **polled** – bred for no horns
- **porcine** – pertaining to swine
- **rams** – male sheep that are not castrated
- **shoat** – young pig
- **sows** – female swine that have produced offspring
- **stags** – male swine that reached maturity before castration
- **steers** – male cattle castrated before maturity
- **wethers** – male sheep that have been castrated

OBJECTIVE 2

Select from a list true statements about the overall process of raising livestock.

Animal production is one of Oklahoma's most important industries. It brings more than $2 billion and thousands of jobs into the state each year. Individually, we all benefit from animal products. Food, medicines, synthetics, and many other every day products come to us from the many different animals raised commercially. We might not be aware of this industry's importance to our economy, or to our lifestyle, but without it our lives would be very different.

A wide variety of animals are raised by ranchers and farmers. The animal producer begins by selecting a breed and choosing seed stock. Day-to-day care includes providing feed, shelter, water, and disease control. Management of the herd through docking (removing the tail), marking animals, breeding, culling, castrating, and other procedures continue until the animals are of sufficient size and weight for sale.

After sale, most animals are slaughtered for their meat and hide, but every part of the animal is used. Bones, blood, hooves and other by-products are processed into a wide variety of products (See Student Supplement 1). These by-products and their uses provide additional industry and jobs in animal production and related fields.

In some cases, animals are not slaughtered after sale. These animals are used for other purposes, such as horse racing, breeding stock, research animals, etc., and provide even more jobs and income.

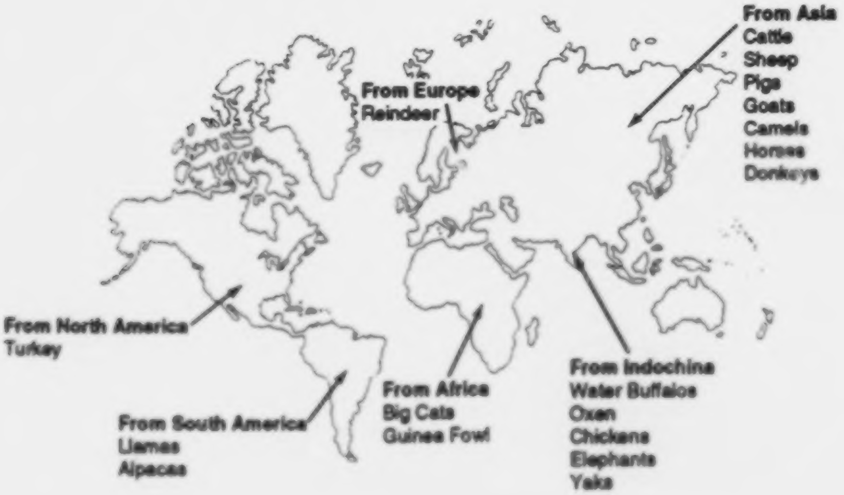
OBJECTIVE 3 **List assets and activities needed to manage a livestock operation.**

No matter what the animal or the desired product, livestock management is a business that requires the following:

- Capital
- Feed/forage
- Fencing
- Labor
- Land
- A market
- Records
- Seed stock
- Shelter
- Specialized tools and machinery
- Veterinary care/vaccinations
- Water

OBJECTIVE 4 **Discuss U.S. and worldwide livestock.**

Although there are thousands of different species of animals, very few are used as livestock. This is because most animals cannot be domesticated (tamed). Most of the animals that are domesticated today were tamed centuries ago. After they were domesticated, their use spread throughout the world.


From Asia
Cattle
Sheep
Pigs
Goats
Camels
Horses
Donkeys
From Europe
Reindeer
From North America
Turkey
From South America
Llamas
Alpacas
From Africa
Big Cats
Guinea Fowl
From Indochina
Water Buffaloes
Oxen
Chickens
Elephants
Yaks

Each different culture relies on certain domesticated animals. The choice of animal depends on the culture's needs and values. For example, cultures that don't use automobiles and other mechanized transportation rely on animals to carry people and products. The most common uses of livestock are:

- Pet/recreational use

  EXAMPLES: Horses

- Research
- Meat, hide, and dairy production

  EXAMPLES: Turkey, reindeer, guinea fowl, cattle, sheep, pigs, goats, chickens

- Transportation

  EXAMPLES: Horses, elephants, camels

- Labor

  EXAMPLES: Yaks, llamas, oxen, donkeys, horses, alpacas, water buffalo

In the United States, traditional livestock includes beef and dairy cattle, swine, sheep, horses, poultry, and goats.

With the exception of the turkey, none of the animals commonly raised in the United States are native to North America. Most were brought by European explorers and settlers.

Internationally, traditional livestock includes the same animals, however, few countries rely on beef as much as we do. Lamb is usually preferred and is actually the world's most-used meat. Other internationally common animals include the camels, oxen, yaks, llamas, alpacas, and reindeer.

Sometimes native animals, such as elephants may be used by some members of the society, but not by others. For example, in some rural African villages elephants are routinely killed for meat and to protect the villagers from harm while urban residents in the same culture rarely eat elephant.

Livestock can also be used a variety of ways. In many cultures livestock is a sign of wealth and is rarely slaughtered. In other cultures, the animals might be slaughtered when they are very young or only after special treatment.

KOBE BEEF

Holy cow! In Japan, beef is a luxury that may cost $50 to $75 per pound. But their favorite, kobe beef, is not regular beef. A special Japanese breed, Wagyu, is pampered and specially fed. Their special diet includes high-protein, high-energy feed. Finishing lasts 18 months and includes daily massages and beer to "reduce stress."

One American breed, a Wagyu-Black Angus cross, has also become popular in Japan. When sold for American consumption, they are finished for four months; when sold to the Japanese, they are finished for ten months and are flown live to Japan.

OBJECTIVE 5

List factors affecting choice of breed.

Before selecting a breed to be raised, the following need to be considered:

- Location - the breed should produce well in your area.
- Climate and terrain
- Adequate forage to support the breed
- Adequate water supplies
- Market demands - if there is no demand for the breed you choose, you will have difficulty selling your stock.
- Market trends
- Breeding stock - you will need to be sure breeding stock is available at a price that is reasonable.
- Facilities - you will need to be able to afford to purchase facilities if you do not have them or improve the ones you have periodically.
- Tools and equipment - you will have to purchase items you do not have.
- Costs of feed, veterinary care, etc.
- Time necessary to show a profit

OBJECTIVE 6

Choose the word or phrase that completes statements about new meat technologies.

The meat you eat is different from the meat Americans ate 100 years ago. For centuries man has "changed" meat. Today cross-breeding and new technologies have increased the amount of usable meat on a carcass and reduced the amount of fat. In addition, new meat technologies allow farmers and ranchers to control costs and make a profit. By lowering production costs, these technologies also make meat affordable to American consumers and protect meat quality.

"Designer meats," such as steak fingers, chicken nuggets, and turkey hams are specially cut, processed, and packaged to satisfy American consumer's demands and desires for convenience, variety, and nutrition.

Green cows? That is just one of many new technologies you might see. In this experiment, scientists propose to genetically alter the cow's skin, adding chlorophyll to it. This would, theoretically, allow the cow to use sunlight to transform basic nutrients into food, just as a plant does.

Other biotechnological changes you might see include females that always have twins, destruction of undesirable recessive genes, and determination of the sex of an animal before fertilization.

Two recent advances are implants and hormone treatments. Implants are pellets placed under the animal's skin to stimulate the animal's pituitary gland. This causes rapid growth, but can negatively affect normal reproductive system functions. Hormones are chemicals produced by the body to cause or control growth.

The bovine growth hormone BST has been shown to increase milk production in dairy cattle by as much as 41 percent. It is currently used in Canada, but not yet approved in the U. S. A similar porcine hormone can increase the amount of meat and decrease the amount of waste fat in some hogs.

Even after the animal is slaughtered, technology continues. New methods of extracting and using animal by-products are announced almost daily.

BRUCELLOSIS – DR. CLAUDE BARTON

In 1975 the United States cattle industry faced a crisis: over 16,000 herds were found to be infected with brucellosis, a disease that causes abortion, sterility, and reduced milk production. Through the work of many ranchers, veterinarians, and government officials this number has been reduced steadily to only 683 herds in July, 1991.

One of the many people responsible for this amazing progress is Dr. Claude Barton, Animal and Plant Health Inspection Service Regional Brucellosis Epidemiologist. His work began in the 1950s as a veterinarian. Most people in the field at that time were experts on one species or disease. Dr. Barton tested herds and treated cattle, and began to see that the disease was not a single-animal or single-herd problem, but one that spread from herd to neighboring herd. Epidemiology, the medical study of disease spread, was a new field at that time. It used statistics, immunology, and other sciences in new ways. Today, epidemiology is an important part of veterinary medicine.

Scientists have worked with government agencies to stop the spread of brucellosis. This disease can result in herd losses through abortion and can be spread to humans. "Even today, we get from 100 to 250 cases of brucellosis in humans every year. And they get it from the animals – that's basically the only way they can get it," Dr. Barton explains. Brucellosis in humans is called undulant fever. He credits the 1988 Rapid Completion Program with stopping the disease. Through this program, herds were tested and owners were encouraged to send all animals from infected herds to slaughter. Regulations concerning slaughtering infected animals were set to insure public safety. Brucellosis does not affect the wholesomeness of the meat processed from infected females. "The owner could collect that money and start all over with a clean herd. Otherwise, they'd see the disease continue to claim animals until soon they'd only have two-thirds of a herd left."

Dr. Barton looks forward to future changes. "Our goal is to have all American herds free of brucellosis by 1996." After brucellosis is controlled, epidemiologist will still have a great future. Veterinary and human epidemiologists have many diseases left to control. "We have new diagnostic tests, people are much better educated and informed, and things are much, much better than they used to be."

VETERINARY MEDICINE TODAY – DR. GEORGE A. HENRY

For ten years Dr. George Henry was in private veterinary practice in North Carolina, Georgia, and Tennessee. His private practice cared for large animals, such as horses and cattle, as well as dogs, cats, and other small animals. "Most of the production animals were beef and dairy cattle. It's regional. I didn't do much pig work, but someone up in Iowa would."

Dr. Henry left private practice and began teaching veterinary medicine at Oklahoma State University. "In private practice you're on call all the time. I was in practice by myself, so I had to work emergencies almost every night," he explains. "Second, there are more tools and equipment here and I can do more."

Dr. Henry chose radiology as a specialty so he could continue to work with the animals while also using new tools and technologies. He was especially interested in applying computer technology to veterinary medicine. "I bought a little computer when I was in practice and wrote a practice management program, back when that was new. After that I continued to learn and I'm still continuing to learn."

One of the new technologies he is exploring is magnetic resonance imaging. MRI uses magnets to control and measure the motion of hydrogen atoms in the body. As the atoms spin, they produce radio waves that a computer can measure and transform into pictures. These pictures are clearer than X-rays and depict soft tissues as well as bones.

"It's still new and is only used on a limited basis. But it wasn't until after World War II, when there was a lot of army surplus radiology equipment, that veterinarians began using X-ray. People used to laugh and say it would never catch on and people would never pay for it. MRI will be just like that. Right now we're just identifying what it can read and accumulating data for when it is in wider use. That's what I would really like to see."

PRODUCTS THAT CONTAIN ANIMAL BY-PRODUCTS

Hooves

- Asphalt
- Insulation
- Linoleum
- Paint and varnish
- Phonograph records
- Cosmetics
- Shaving cream
- Waterproofing
- Cement
- Textiles
- Fabric softeners
- Matches

Fats

- Fats and grease for human consumption
- Fats for animal consumption
- Tallow for candles
- Leather treatments
- Lubrication oils
- Synthetic rubber
- Polishes and floor waxes
- Soap
- Glue and adhesives
- Crayons

Meat, blood, and bone meal

- Animal feeds
- Fertilizer

Hides and skins

- Leather
- Wool
- Edible gelatin (pork)

Casings (intestines, stomach, bladder, etc.)

- Sausage containers
- Strings for musical instruments
- Strings for tennis rackets
- Surgical ties

Pharmaceutical and diagnostic products

- Replacement therapies (insulin)
- Drug substances
- Diagnostic tools (TSH for diagnosing thyroid disorders)
- Substances for use in vaccine manufacture

CAREERS IN ANIMAL SCIENCE

Scientists, Engineers, and Related Specialists

- Agricultural engineer (livestock, buildings and equipment)
- Animal scientist
- Biochemist
- Entomologist
- Environmental engineer
- Food engineer
- Food scientist
- Geneticist
- Microbiologist
- Nutritionist
- Veterinarian

Managers and Financial Specialists

- Business manager
- Credit analyst
- Economist
- Farm investment manager
- Farm loan officer
- Financial analyst
- Food service manager
- Land bank branch manager
- Retail manager
- Wholesale manager

Marketing, Merchandising, and Sales Representatives

- Food broker
- Grain merchandiser
- Livestock buyer
- Market analyst
- Market research analyst
- Marketing manager
- Sales representative
- Technical service representative

Education, Communication, and Information Specialists

- Agriculture education teacher
- College faculty member
- Agricultural educator
- Cooperative extension agent
- Editor
- Public relations specialist
- Reporter
- Agricultural journalist
- Agricultural news director

Social Services Professionals

- Dietitian
- Food inspector
- Nutrition counselor

Agricultural Production Specialists

- Farmer
- Feedlot manager
- Professional farm manager
- Rancher

General Occupations in Animal Science

- Animal behaviorist
- Animal breeder
- Animal caretaker
    - Animal attendant
    - Animal control officer
- Animal cytologist
- Animal ecologist
- Animal health products distributor
- Animal inspector
- Animal keeper
- Animal nutritionist

- Animal physiologist
- Animal scientist
- Animal taxonomist
- Animal trainer
- Animal treatment investigator
- Artificial breeding distributor
- Artificial breeding technician
- Artificial insemination herd sire evaluator
- Artificial insemination herd sire manager
- Artificial inseminator
- Breed association field worker
- Breeding researcher
- Butcher
- Central test station manager
- Central test station worker
- County agricultural agent
  Agricultural agent
  County adviser
  County agent
  Extension agent
  Extension-service agent
  Extension worker
  Farm adviser
  Farm agent
- Custom feed mill operator
- Drug company representative
- Extension service livestock specialist
- Farm broadcaster
- Farmhand
- Farm manager
- Farmworker, general
  Hired worker
  Chore tender
  Farm laborer
- Farmworker, livestock
  Laborer, livestock
  Ranch hand, livestock
- Feed and farm management adviser
- Feed ration developer and analyst
- Food processing supervisor
- 4-H club agent
- Inspector, grain mill products
- Livestock agent
- Livestock auctioneer
- Livestock commission agent
- Livestock herder
- Livestock inspector
- Livestock producer
- Livestock rancher
  Livestock breeder
  Livestock farmer
- Livestock yard attendant
- Livestock yard supervisor
- Meat cutter
- Meat grader
- Meat inspector
- Meat science researcher
- Muscle biology researcher
- Nutritional physiologist
- Nutrition researcher
- Ova transplant specialist
- Pharmaceutical company representative
- Production researcher
- Reproduction researcher
- Reproductive physiologist
- Superintendent, grain elevator
- Supervisor, animal cruelty investigation
  Animal humane agent supervisor
- Supervisor, artificial breeding ranch
- Supervisor, feed mill
- Supervisor, livestock yard
- Supervisor, stock ranch
- Veterinarian
- Veterinarian, laboratory animal care
- Veterinarian, poultry
- Veterinarian's assistant
- Veterinary anatomist
- Veterinary bacteriologist
- Veterinary epidemiologist
- Laboratory technician
- Veterinary livestock inspector
- Veterinary meat inspector
- Veterinary parasitologist
- Veterinary pathologist
- Veterinary pharmacologist
- Veterinary physiologist
- Veterinary virologist
- Veterinary virus-serum inspector

Beef Occupations

- Beef breeder
- Beef farmhand
- Beef herder
- Cattle buyer
- Cattle feeder
- Cowpuncher
  Puncher
  Ranch rider
- Feedlot supervisor

- Feedlot maintenance worker
- Stock ranch supervisor
- Top screw
  - Lead rider
  - Ramrod
  - Top waddy

Dairy Occupations

- Cheesemaker
  - Cheese cooker
- Dairy barnman
- Dairy cattle herder
- Dairy choreman
- Dairy cow washer
- Dairy farm worker
  - Laborer, dairy farm
- Dairy helper
- Dairy herdsman
- Dairy herd supervisor (DHIA)
- Dairy management specialist
- Dairy nutrition specialist
- Dairy sanitarian
- Dairy scientist
- Dairy tester
- Manager, dairy farm
- Milker, machine operator
- Milk plant supervisor
- Milk sampler
- Supervisor, dairy farm
- Supervisor, dairy processing
  - Butter production supervisor
  - Cheese production supervisor
  - Instant-powder supervisor
  - Pasteurizing supervisor

Swine Occupations

- Hog buyer
- Swine breeder
- Swine farmhand
- Swine herder

Sheep Occupations

- Camp tender
- Fleece tier
- Lamber
- Sheep breeder
- Sheep farmhand
- Sheep herder
  - Herder
  - Mutton puncher
  - Shepherd
- Sheep shearer
  - Sheep clipper
  - Stock clipper
  - Wool shearer
- Supervisor, wool-shearing
- Wool buyer
- Wool-fleece grader
- Wool-fleece sorter

Horse Occupations

- Barn boss
  - Corral boss
  - Hostler
  - Lot boss
  - Stable manager
- Equine dentist
- Farrier
- Hoof and shoe inspector
- Horse breeder
- Horse exerciser
- Horse farmhand
- Horse herder
- Horseshoer
  - Plater
- Horse stable attendant
- Horse trainer
- Paddock judge
- Race horse trainer
- Racing secretary and handicapper
- Stable attendant
  - Barnworker
  - Groom
  - Horse tender
  - Mule tender
  - Stallion keeper

Poultry Occupations

- Blood tester, fowl
- Caponizer
- Chick grader
  - Poultry culler
- Chick sexer
- Chicken breeder
- Egg candler
- Farm worker, poultry
- Field service technician, poultry
- Grader, dressed poultry
- Laborer, poultry farm

- Laborer, poultry hatcher
    - Hatchery helper
    - Incubator helper
- Manager, poultry hatchery
- Poultry breeder
    - Chicken fancier
- Poultry breeding researcher
- Poultry debeaker
- Poultry farmer
    - Poultry farmer, egg
    - Poultry farmer, meat
- Poultry farmhand
- Poultry field service technician
- Poultry geneticist
- Poultry grader
- Poultry inseminator
- Poultry nutrition researcher
- Poultry products sales manager
- Poultry products technologist
- Poultry scientist
- Poultry tender
- Poultry vaccinator
- Supervisor, poultry farm
- Supervisor, poultry hatchery
- Turkey breeder
- Turkey producer

Goat Occupations

- Goat herder
- Milk producer

DRUGS USED IN ANIMAL PRODUCTION

Antimicrobial Drugs – These drugs kill microbes in the system. They include antibiotics that kill infections. They are usually used as feed additives.

Hormones and hormone-like substances – Hormones are chemicals produced by glands in the body to regulate and control growth and body functions. Some are natural, that is, they are taken from the carcasses of slaughtered animals and implanted in people or other animals. Other drugs use synthetic hormones engineered by scientists. Hormones can be administered in a variety of ways, including feed additives, injections, and implants.

Anthelmintics – These are dewormers used as food additives to control roundworms, nodular worms, whipworms, and other parasites.

Coccidiostats – These are added to poultry feeds to prevent the disease coccidiosis.

Poloxalene – Added to feeds when some animals are put to pasture or fed rich foods such as green alfalfa. They prevent bloating and allow gasses to escape.

Copper compounds – These are added to some swine feeds to increase growth. They may interfere with lagoon manure disposal systems, however.

Probiotocs – These are used to alter bacterial levels in digestive tracts. They are used in place of antibiotics, but are generally less successful.

Feed preservatives and digestive aids – A wide variety of chemicals can be added to feeds to keep them from spoiling or to aid in animal digestion. These can be as common as baking soda (sodium bicarbonate) or very complex new products.

POULTRY PRODUCTION

Recent changes in American diets have drastically affected the poultry industry. While egg consumption is down, broiler and turkey production is up.

This industry is different from other major livestock industries in several ways. It does not require the amount of time or land necessary to raise other animals. An added benefit is that while one product (the animal) is growing, a second product (the egg) can produce income. This industry can be highly mechanized, reducing labor, and usually allows a quick return on investments. On the other hand, poultry raising requires careful management of sanitation, disease, and quality control. Waste disposal and odor control can be difficult. There is also a risk of major animal loss due to predators and disease as well as a danger of the animals piling up and suffocating when they are excited.

The four basic types of poultry production are:

- Egg and chicken production
- Broiler production (chickens produced solely for meat; usually slightly larger than other chickens)
- Replacement pullet (a hen less than a year old) production
- Meat production (usually duck, turkey, and goose)

HORSE PRODUCTION

People have always loved horses. For centuries they were our main source of transportation, and even today, they are raised primarily for pleasure. Some common breeds and their uses are:

American Mustang	Show and pleasure riding, endurance trail riding, jumping
American Saddlebred	Pleasure and harness riding, showing
Appaloosa	Pleasure riding, showing, racing, working cattle, jumping, endurance trail riding
Arabian	Pleasure riding, showing, racing, endurance trail riding
Belgian	Harness riding, relic breeds, working
Clydesdale	Harness riding, relic breeds, working
Morgan horse	Harness riding, working, pleasure riding, showing
Palomino	Pleasure and harness riding, showing, working cattle
Percheron	Harness riding, relic breeds, working
Pinto/Paint	Pleasure riding, showing
Quarter Horse	Pleasure riding, showing, racing, working cattle
Tennessee Walking Horse	Pleasure riding, showing
Thoroughbred	Pleasure riding, racing, jumping

In Oklahoma, 55 percent of all horses are quarter horses.

The three basic horse industries are breeding, training, and boarding stables, but many other businesses are based on horses and their uses. It has been estimated that over $16 billion is spent annually in horse-related industries. Horse racing is a favorite sport of many Americans.

Horses require training and care other animals do not. The horse must be broken and properly trained for work, recreational use, or racing. Tooth care and hoof care are important for preserving the animal's health. Although horses do not require elaborate structures, they do require solid protection from storms and bad weather. The tack and other related equipment must also be stored and protected.

ANIMAL PRODUCTION INDUSTRIES

Aside from unusual uses for animal products, you may also be surprised at the variety of animals produced. Consider these animal-production industries:

Common pets

- Birds
- Cats
- Dogs
- Tropical fish

Many families consider their pets an important part of the family. They provide companionship, entertainment, and recreation. Pets are a thriving business and breeders can make a lot of money by selling animals as pets. Today, you can often find pet shops in the local mall.

Research animals

- Guinea pigs
- Insects
- Mice
- Monkeys
- Rabbits
- Rats

Animals are selected for research depending on the type of research and the habits or traits of the animal. For example, monkeys are used for psychological research because they are similar to humans, but insects are preferred for genetic research, because they reproduce quickly.

Research also uses common animals. Swine and dogs are used for medical research because some organs, such as the heart, are very similar to those of humans.

Controversy over using animals for research has occurred and some businesses and research facilities are using computer analysis rather than animal testing. However, many scientists and consumers believe that the only safe method of testing new products and techniques is through animal testing.

Pelts and fur

- Angora goats
- Cashmere goats
- Chinchillas
- Mink
- Rabbits

Meat and investment

- Bison
- Fish
- Miniature horses
- Ostriches

  NOTE: In 1991 the Wall Street Journal listed ostriches as one of the best financial investments available.

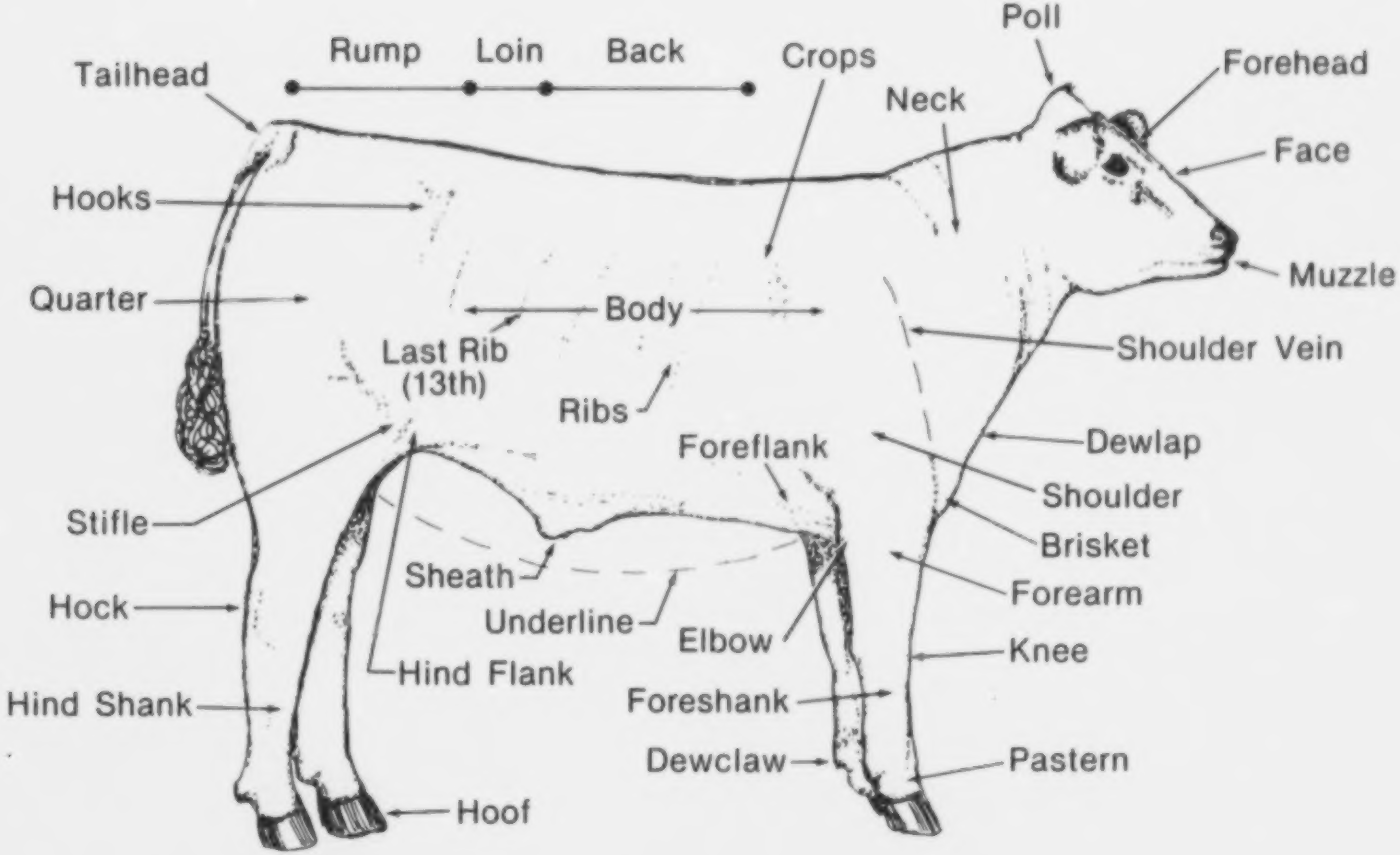
- Pot-bellied pigs
- Snakes

Other uses

- Bees and insects
- Exotics (lions, tigers, giraffes, etc.)

Insects may not seem like livestock, but they are an animal product with increasing importance. Many insect species are used today for natural pest control. The praying mantis, for example, loves aphids. Other insects have been cross-bred or genetically altered for other uses. One butterfly was recently produced with an iridescent silver wing and an appetite for illegal drugs growing in South and Central America. When large flocks of the butterflies settle in crop areas, pilots can easily spot the reflection of their silver wings from the air. Those crops can then be targeted for destruction as part of the war on drugs.

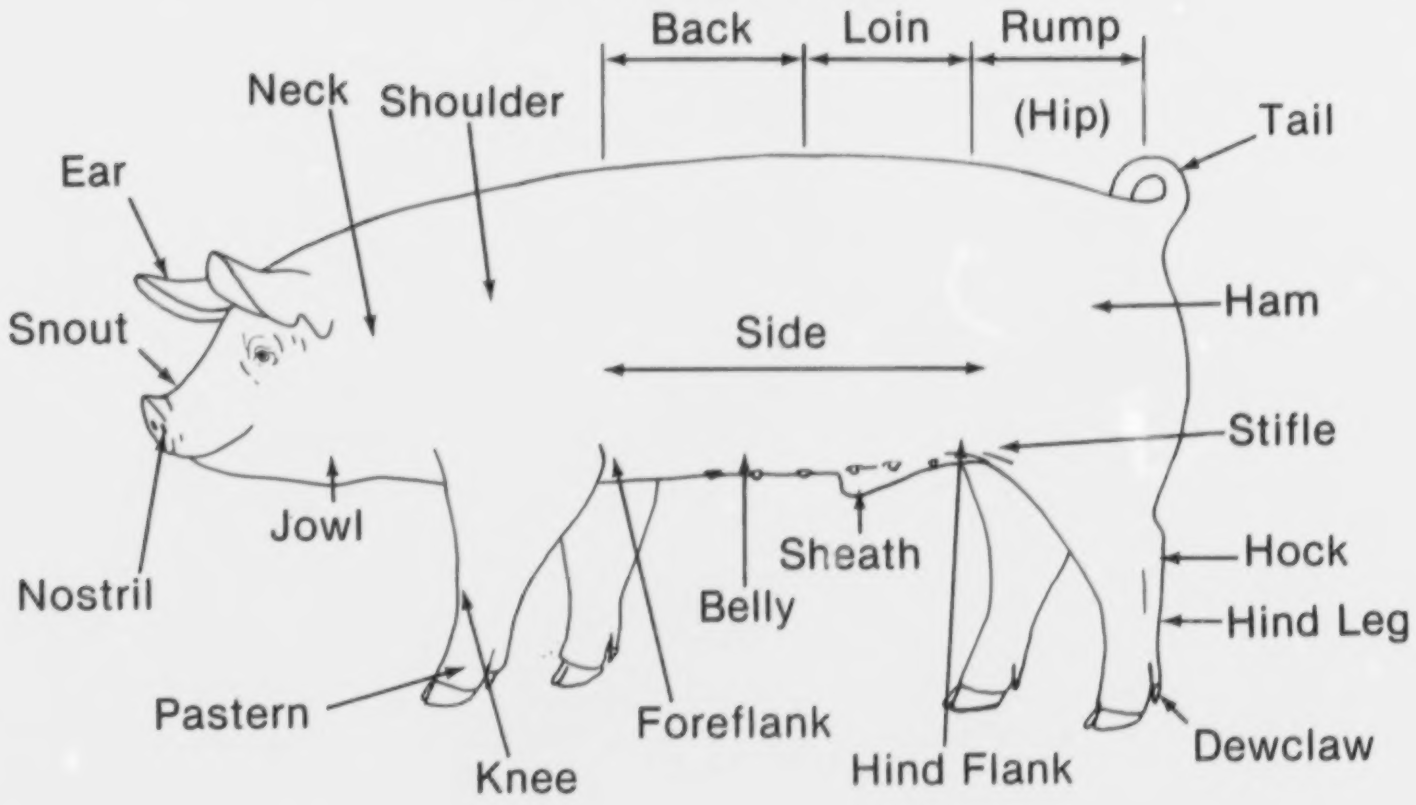
Parts of a Beef Animal


Poll
Rump
Loin
Back
Crops
Forehead
Tailhead
Neck
Face
Hooks
Muzzle
Quarter
Body
Shoulder Vein
Last Rib (13th)
Ribs
Dewlap
Foreflank
Stifle
Shoulder
Brisket
Sheath
Hock
Underline
Forearm
Elbow
Knee
Hind Flank
Foreshank
Hind Shank
Dewclaw
Pastern
Hoof

TRANSPARENCY MASTER 1 - 8th Grade Agriculture
CIMC - VIII - 39

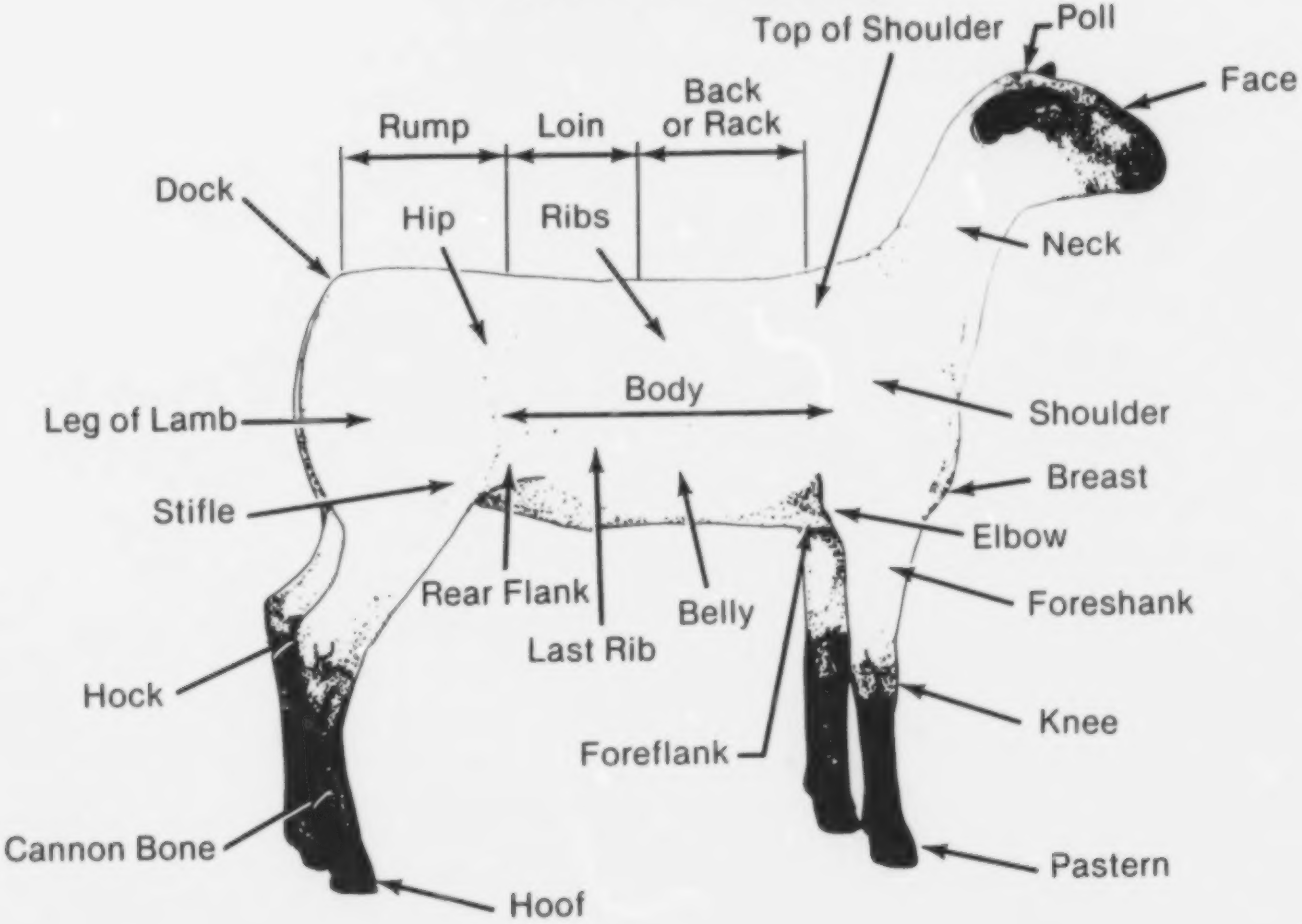
TM 1

Parts of a Hog


Back
Loin
Rump
(Hip)
Neck
Shoulder
Tail
Ear
Snout
Ham
Side
Stifle
Jowl
Sheath
Hock
Nostril
Belly
Hind Leg
Pastern
Foreflank
Dewclaw
Knee
Hind Flank

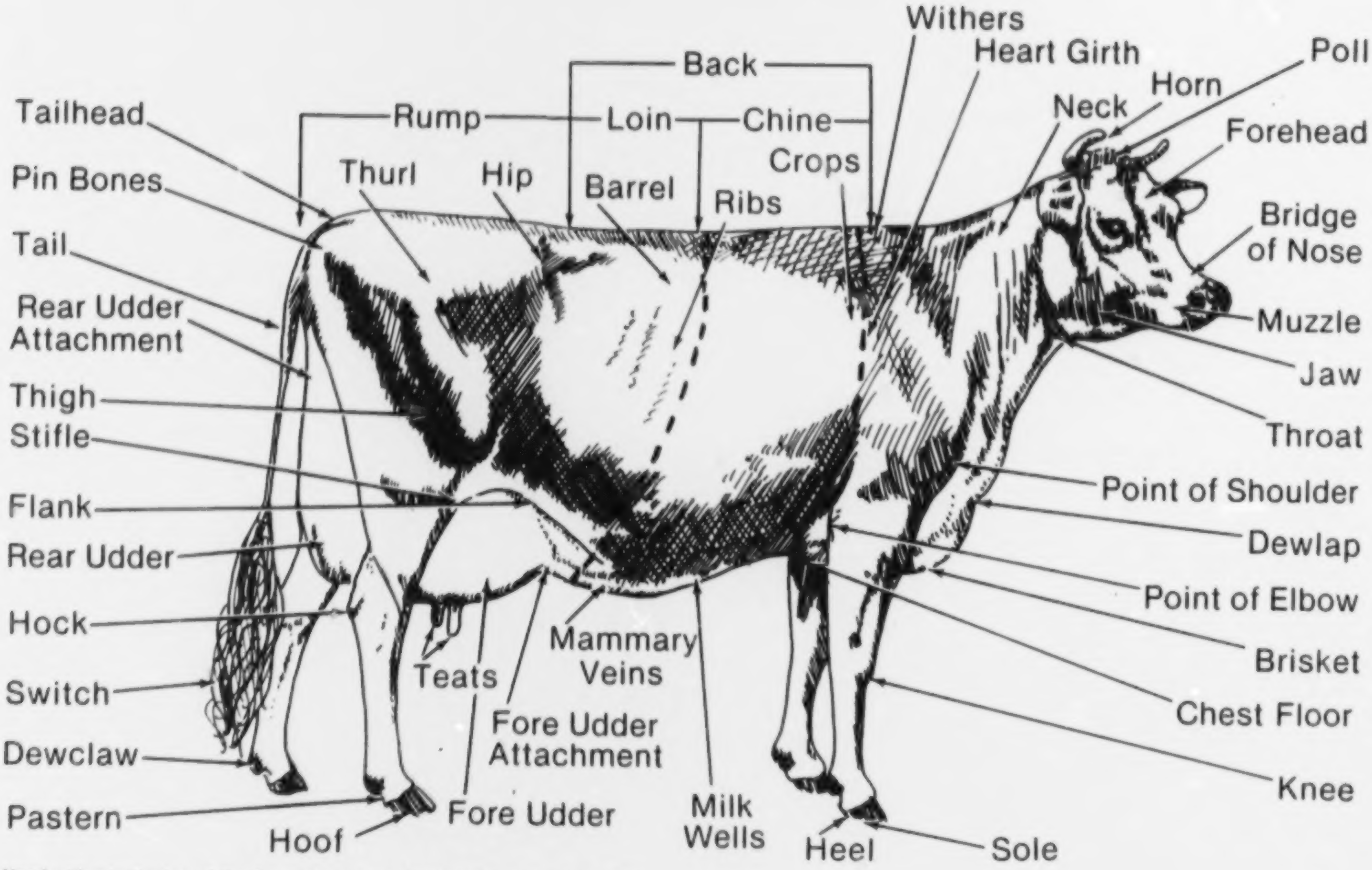
Adapted with permission of the National Pork Producers Council

Parts of a Sheep


Top of Shoulder
Poll
Face
Rump
Loin
Back
or Rack
Dock
Hip
Ribs
Neck
Body
Leg of Lamb
Shoulder
Breast
Stifle
Elbow
Rear Flank
Belly
Foreshank
Last Rib
Hock
Knee
Foreflank
Cannon Bone
Pastern
Hoof

TRANSPARENCY MASTER 3 - 8th Grade Agriculture
CIMC - VIII - 43

Parts of a Dairy Cow


Withers
Back
Heart Girth
Poll
Horn
Neck
Tailhead
Rump
Loin
Chine
Forehead
Crops
Pin Bones
Thurl
Hip
Barrel
Ribs
Bridge of Nose
Tail
Rear Udder Attachment
Muzzle
Jaw
Thigh
Stifle
Throat
Point of Shoulder
Flank
Dewlap
Rear Udder
Point of Elbow
Hock
Mammary Veins
Brisket
Teats
Switch
Chest Floor
Fore Udder Attachment
Dewclaw
Knee
Pastern
Fore Udder
Milk Wells
Hoof
Heel
Sole

Used with permission of the American Jersey Cattle Club, Columbus, Ohio

ACTIVITY SHEET 1

Development of:
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Applying intuitive thinking techniques

- If students have difficulty applying intuitive thinking techniques:

  - Remind them that one idea stimulates another and they should keep going without judging or criticizing their ideas.

  - Encourage them to trust their own **informed** thinking.

  - Remind them that when working with others, all ideas are potential winners, and should be respected and accepted until time for discussion and evaluation.

  - Get students involved in sharing ideas with a creativity-enhancing exercise, such as listing all the uses for a clothespin or activities such as those recommended in a book on creativity.

  NOTE: *A Whack on the Side of the Head: How to Unlock Your Mind for Innovation* is a creativity activity book by Roger Von Oech and published by Warner Books, New York, 1983. Includes games, illustrations, exercises and self-evaluation tests.

Cognitive Activities Skills
- Apply intuitive thinking techniques

LIST COMMON AND EXOTIC MEATS

How many meats have you eaten? You might be surprised at how few! List all the meats you have eaten in the blanks below. Write common meats in one column, and meats you consider exotic in the other column. Then list all the other meats you can think of. Compare your results with your classmates.

Common meats	**Exotic meats**
EXAMPLES: beef, turkey	EXAMPLES: rattlesnake, alligator
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________
______________	______________

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, oral communication, creative thinking/problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Selecting useful resources
  - Locating resources
  - Finding materials in library
  - Using standard references
  - Following written instructions

  WRITING SKILLS

  - Taking notes
  - Using note cards

  ORAL COMMUNICATION SKILLS

  - Making informative presentations
  - Using good speaking techniques
  - Selecting/using words effectively
  - Using effective body language
  - Presenting appropriate appearance

548

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues
- Analyzing/synthesizing information
- Creating a finished product

EMPLOYABILITY SKILLS

- Practicing good personal presentation
- Developing self-confidence/esteem

- Emphasize to the students that criteria for grading their assignment will include all of the following:

Content
1. Researched topic
2. Included an introduction, body and a conclusion
3. Organized information in a logical way

Delivery
1. Memorized introduction
2. Report delivered extemporaneously from note cards
3. Preparation and practice are evident
4. Good personal presentation
5. Eye contact with audience
6. Memorized conclusion

- If students have difficulty selecting useful resources:
  - Discuss various resources they could use.
  - Discuss the type of information needed.

    EXAMPLE: Definitions, dates, instructions, historical facts, names
  - Suggest a general information resource such as an encyclopedia or the card catalog as a starting point.
- If students have difficulty locating resources:
  - Discuss different ways of obtaining the information.
  - Invite a librarian to discuss available resources and how to use them.
  - Review basic library skills.

- If students have difficulty finding materials in library:
  - Discuss the type of cataloging system in use.
  - Demonstrate the use of the cataloging system.
  - Instruct them to practice the use of the cataloging system.
  - Discuss the arrangement of the library.
  - Discuss the importance of being skilled in the use of the library.
  - Remind them that librarians are available to assist them.
- If students have difficulty using standard references:
  - Locate and explain the purpose of the reference section of the library.
  - Discuss the fact that each standard reference provides a specific type of information.
- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty taking notes:
  - Review basic note-taking techniques, including name of source, date of publication and publisher.
  - Remind them to focus on the main point or issue.
  - Suggest they practice taking notes.
  - Discuss the importance of taking accurate notes.

- If students have difficulty using note cards:
  - Discuss the fact that a single note card can isolate certain facts.
  - Stress the fact that information can be re-organized by simply rearranging the note cards.

    EXAMPLE: If a student has taken careful notes on the industrial revolution and now needs to write a paper on inventors during that time period, he or she can use the note cards relating to inventors or inventions as a resource.
  - Discuss various ways of coding note cards.

    EXAMPLE: Variety of card colors, colored dots, numerical code, alphabetical code
- If students have difficulty making informative presentations:
  - Remind them that being prepared is the best way to handle nerves and insure a successful presentation.
  - Encourage them to practice in front of a mirror, for their families and close friends before they make the speech in class.
  - Explain that being nervous is a natural part of making a speech. The fear will go away within 30 seconds after they start.
  - Suggest that the student who gets a dry mouth bring a glass of water to the stand.
  - Stress that the people in the audience are not critics, waiting for the speaker to make a mistake. Audiences WANT the speaker to succeed; they want the information and entertainment in a presentation.
- If students have difficulty using good speaking techniques, selecting/using words effectively, and using effective body language:
  - Suggest that they watch good speakers on television or in local assemblies or other programs.
  - Stress that students should use a natural, conversational approach.
  - Stress the importance of expressing ideas clearly, in a well-organized way, with a clear beginning, middle, and end.

  - Encourage students to use good language and more specific language than in their everyday speech.
  - Stress that good preparation and practice are the most important factors in sounding and looking good.
- If students have difficulty presenting appropriate appearance, stress that they are asking others to look at them (their whole bodies) and to form an impression about what they say; and dressing appropriately is part of making that impression a good one.
- If students have difficulty collecting/recording information:
  - Suggest resources and relevant television programs
  - Instruct them to read carefully to obtain information
  - Stress the importance of accuracy in recording information.
- If students have difficulty identifying critical elements/issues:
  - Instruct them to read or examine their sources carefully, noting key words and ideas.
  - Suggest they list the questions they hope to answer.
- If students have difficulty analyzing/synthesizing information:
  - Remind them that to analyze they must break the information down into all its component parts in order to understand it.
  - Remind them that to synthesize information they should put all the component parts together in a way that makes the information usable.
- If students have difficulty creating a finished product:
  - Review the action plan to determine whether it will bring the desired results.
  - Discuss the way in which the finished product is organized.
  - Review the requirements of the assignment.
  - Suggest they use intuitive thinking techniques to formulate an idea.
  - Instruct them to work one step at a time until the project is finished.

  - Suggest they write a plan for attaining their goal.

- If students have difficulty practicing good personal presentation:
  - Tell them that according to communication research first impressions are based first on appearance and second on speech habits.
  - Remind them to check personal appearance, to be prepared, and to maintain a positive attitude.

- If students have difficulty developing self-confidence/esteem:
  - Discuss the importance of esteem in all areas of life.
  - Stress that confidence in our public speaking skills can create opportunities.
  - Remind them that when a speaker has information that other people want to know, they will listen.
  - Discuss the idea that if a person acts confident, he becomes more confident.
  - Let students discuss what behaviors and characteristics communicate confidence to them.

ASSIGNMENT SHEET 1

ANIMAL PRODUCTION VIII

Name ______________________ Score __________

OBJECTIVE 7 **Give a report on trends in animal production.**

INTRODUCTION

It may seem that animal production and public speaking have very little in common. Actually, if you decide to show an animal, public speaking can help you answer the judges' questions quickly, clearly, and with confidence. If you do not go into animal production, public speaking is still a valuable skill you will be able to use as a student and as an employee.

DIRECTIONS

Research and Reference Skills
- Select useful resources
- Locate resources
- Find materials in library
- Use standard references

Functional Reading Skills
- Follow written instructions

Research Skills
- Take notes
- Use note cards

1. Select one of the topics listed below:
   - Animal welfare
   - Ostrich production in the United States
   - Use of bovine growth hormone
   - Use of drugs in slaughter animals
   - Growth of Oklahoma's Quarter Horse industry
   - Food safety
   - Changes in America's meat consumption
   - Genetically-engineered animals
2. Visit your local or school library. Find two publications on your topic.

If you can't find what you need

- Ask a librarian for help
- Check the latest Reader's Guide
- Ask your teacher for suggestions
- Ask your county extension agent for publications

3. Take notes on what you read. Use 3 × 5 cards and put only one fact on each card.

Oral Presentation Skills

- Make informative presentations
- Use good speaking techniques
- Select/use words effectively
- Use effective body language
- Present appropriate appearance

Cognitive Activities Skills

- Collect/record information
- Identify critical elements/issues
- Analyze/synthesize information
- Create a finished product

Job Acquisition/ Development Skills

- Practice good personal presentation
- Develop self confidence/esteem

4. Arrange the cards in the order you will use them in your speech. You will probably need to move them around a few times. As you arrange them, think about what you will say in your report.

5. Write an introduction, a body, and a conclusion. They should summarize what you plan to say. The introduction should also stimulate interest in your topic. For example, if you are discussing ostrich production, you might say "What would you do if you had a million dollars to invest? Would you invest in stocks and bonds? Real estate? Well, according to the Wall Street Journal, you might be better off investing in ostriches!" This tells that you will be explaining that ostriches are a growing industry, but tells it in an interesting way. Memorize your introduction and conclusion so you can maintain eye contact with your audience and have a strong start and finish.

6. Do not write out your entire speech. Practice from your cards. Writing the whole speech out will make it sound awkward.

7. Practice giving your speech. Stand in front of a mirror and watch how you stand and move. Use your hands if it feels comfortable. Keep your feet shoulder-width apart. Look at the audience as you speak.

8. When it is time to give the speech, be sure your hair is combed, your notes are in order, and your clothes are clean. If you are nervous, don't worry. You'll feel more comfortable when your speech is underway.

ASSIGNMENT SHEET 2

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  – Taking notes

  ORAL COMMUNICATION SKILLS

  – Applying active listening skills

  – Drawing conclusions/making generalizations

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  – Identifying critical elements/issues

  – Identifying underlying causes

  – Analyzing/synthesizing information

  – Drawing conclusions

  – Predicting results/outcomes

  – Applying intuitive thinking techniques

- If students have difficulty applying active listening skills:

  – Stress the importance of focusing on the speaker.

  – Remind students that maintaining eye contact enhances listening ability.

  - Practice concentrating on the speaker and ignoring common distractions.
  - Suggest that they be ready to listen before beginning the communication.
- If students have difficulty drawing conclusions and making generalizations:
  - Suggest that they consider each trend and review their notes.
  - Urge them to organize their thoughts before answering the questions.
  - Ask them to compare what they learned in the reports to what they've learned from television, other reading, conversations and their own experience.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 2 — ANIMAL PRODUCTION — VIII

Name ______________________________ Score __________

OBJECTIVE 8 **Compare trends in animal production.**

INTRODUCTION As your classmates give their oral reports, you will hear about some trends in animal production. A trend is a change that seems to be happening. Sometimes people predict trends that never occur. Sometimes people see different trends in the same area. As your classmates give their reports, listen carefully to identify trends, take notes on each one, and then complete this assignment.

DIRECTIONS As each report is given, list the topic and any trends described.

Research Skills
- Take notes

Listening Skills
- Apply active listening skills
- Draw conclusions/make generalizations

Cognitive Activities Skills
- Identify critical elements/issues
- Identify underlying causes
- Analyze/synthesize information
- Draw conclusions
- Predict results/outcomes
- Apply intuitive thinking techniques

1. What trend(s) did you already know about?

   ____

   ____

2. What trend(s) did you not know about?

   ____

   ____

3. What trend was mentioned most often?

   ____

   ____

4. Which trends were discussed that you don't think will actually happen?

   ____

   ____

Why?

5. Which trends seem to contradict each other?

6. Which ones do you think will happen?

Why?

ASSIGNMENT SHEET 3

Development of:
SCIENCE SKILLS

- Introduce the assignment to the students by discussing why science skills are important.
- Discuss with them the following skills which are relevant to this task:

  SCIENCE SKILLS

  – Identifying/classifying living organisms

- If students have difficulty identifying/classifying living organisms:
  - Discuss the major identifying characteristics of each breed.
  - Help students recognize similar and contrasting characteristics.
  - Work on identifying parts and combining the known parts into the whole.
  - Allow them to review the slides as needed.

ASSIGNMENT SHEET 3

ANIMAL PRODUCTION

VIII

Name ______________________ Score __________

OBJECTIVE 9

Identify breeds of livestock.

INTRODUCTION

The ability to identify different breeds of livestock is a basic part of animal production. Different breeds have different characteristics that make each important in their own way. For example, some breeds of cattle are well suited for the hot weather and dry conditions of the Southwest. Other breeds thrive in the cold conditions of a northern winter.

DIRECTIONS

Your instructor will show slides of different breeds of livestock. Write the correct name in the space below.

Life Science Skills
- Identify/classify living organisms

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________
11. ______________________
12. ______________________
13. ______________________
14. ______________________
15. ______________________

16. ____________________

17. ____________________

18. ____________________

19. ____________________

20. ____________________

21. ____________________

22. ____________________

23. ____________________

24. ____________________

25. ____________________

26. ____________________

27. ____________________

28. ____________________

29. ____________________

30. ____________________

31. ____________________

32. ____________________

33. ____________________

34. ____________________

ASSIGNMENT ANSWERS | *ANIMAL PRODUCTION* *VIII*

ASSIGNMENT SHEET 1	The student should be evaluated on content, poise, clarity, and speech construction.
ASSIGNMENT SHEET 2	The student should be evaluated on correctly interpreting information given during speeches.
ASSIGNMENT SHEET 3	Make sure answers correspond with the order in which the slides were shown.

JOB SHEET 1

Development of:
READING SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, oral communication, interpersonal or relating, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  ORAL COMMUNICATION SKILLS

  - Communicating with co-workers

  INTERPERSONAL OR RELATING SKILLS

  - Interacting with co-workers

  EMPLOYABILITY SKILLS

  - Mastering a specific job task/procedure
  - Practicing good work habits/attitudes
- If students have difficulty communicating or interacting with co-workers:
  - Explain the importance of teamwork.
  - Suggest that workers trade jobs in order to better understand how to assist one another.
  - Review listening skills, questioning techniques, giving/following directions, and non-verbal communication.

- If students have difficulty mastering a specific job task/procedure:
  - Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.
  - Suggest they study each component of the procedure to determine which area is causing difficulty.
  - Review the entire procedure.
  - Team them with proficient students or professionals to practice the procedure.
- If students have difficulty developing good work habits/attitudes:
  - Encourage them to become familiar with the entire procedure before they begin the work.
  - Discuss the role that good work habits and attitudes have in obtaining and retaining employment.
  - Discuss what behaviors and attitudes constitute good work habits.
  - Make sure the student knows what is expected of him or her.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

JOB SHEET 1 — ANIMAL PRODUCTION — VIII

OBJECTIVE 10 **Use flank casting and castration restraint on cattle.**

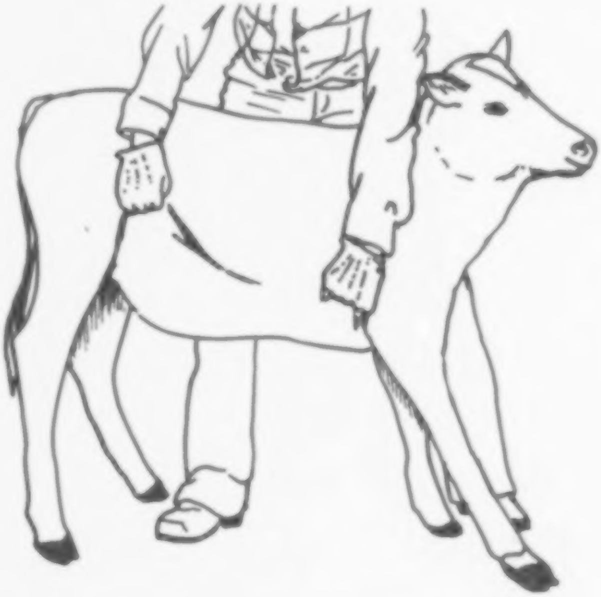
EQUIPMENT AND SUPPLIES

- Lightweight calf (250 to 300 lbs.)
- Rope

PROCEDURE

Flank casting

1. Rope the calf.
2. Approach the calf without over-exciting it.
3. Reach across the calf's back and grasp the hindflank and front leg with your hands.



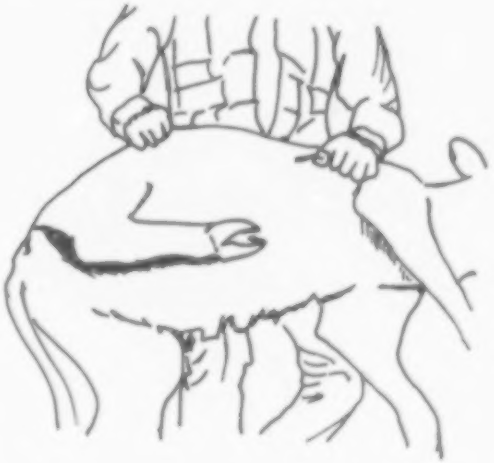
Functional Reading Skills
- Follow written instructions

Interactive Communication Skills
- Communicate with co-workers

General Relating Skills
- Interact with co-workers

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

4. Lift the calf from the ground with your arms pulling on the hindflank and front leg. Your knees should be pushing on the calf's side.



5. Ease the calf down with the weight against your legs so that the calf falls to the ground gently.

PROCEDURE

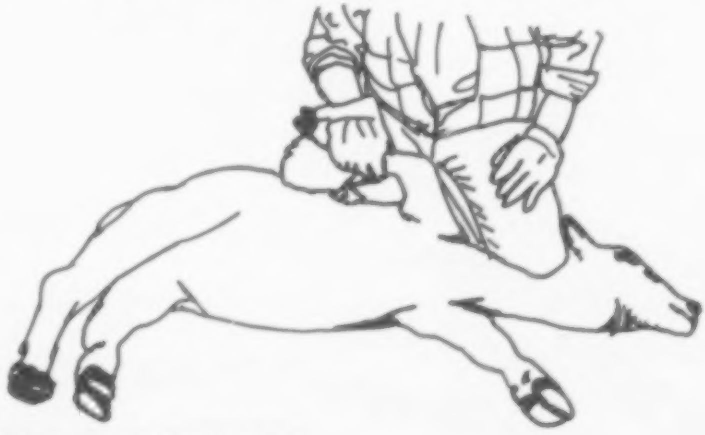
Castration restraint

NOTE: This restraint requires two people. The first person completes steps 1-3. Then the second person completes steps 4-5.

1. Release the hindflank quickly and grasp the front leg with both hands.

2. Place one knee on the neck and the other knee behind the shoulders, facing the calf's front leg.

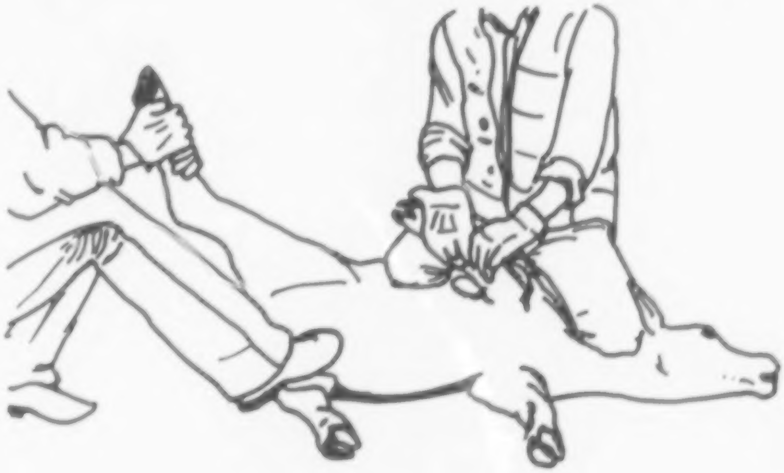
3. Pull the calf's front leg up toward your stomach.



To be completed by the second person:

4. Grab the upper hind leg at the hock and ankle with both hands and pull it back from the calf.

5. Sit down behind the calf with one leg out toward the calf's rump and the other leg pushing the bottom hind leg of the calf just above the hock, moving the calf's leg as far forward as possible.



6. Have your instructor check your work.

7. Put away tools and equipment and clean work area.

JOB SHEETS 2 & 3

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  EMPLOYABILITY SKILLS

  - Mastering a specific job task/procedure
  - Practicing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 5.

JOB SHEET 2 — ANIMAL PRODUCTION — VIII

OBJECTIVE 11 **Use vaccination or castration restraint on small pigs.**

EQUIPMENT AND SUPPLIES

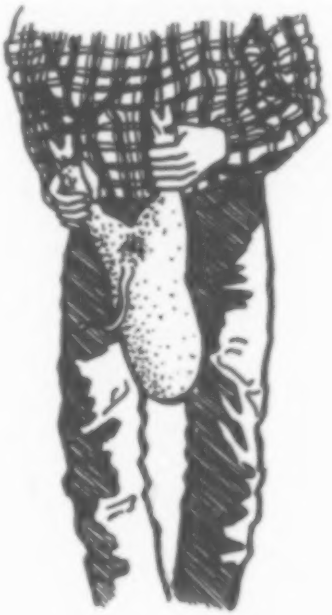
- Weaning-age pig or pig under 60 pounds

PROCEDURE

1. Grab the pig by the hind legs with your hands.
2. Pick the pig up off the ground, pulling the pig toward your body.

   NOTE: For castration, the pig's back should be against you; for vaccination the pig's abdomen should be against you with the pig's shoulders between your legs.

VACCINATION TECHNIQUE



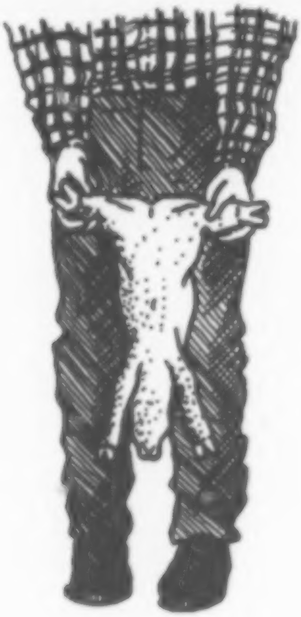
Functional Reading Skills

- Follow written instructions

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Practice good work habits/attitudes

CASTRATION TECHNIQUE



3. Have instructor check your work.
4. Clean up work area.

OBJECTIVE 12 **Use castration and docking restraint on small sheep.**

EQUIPMENT AND SUPPLIES

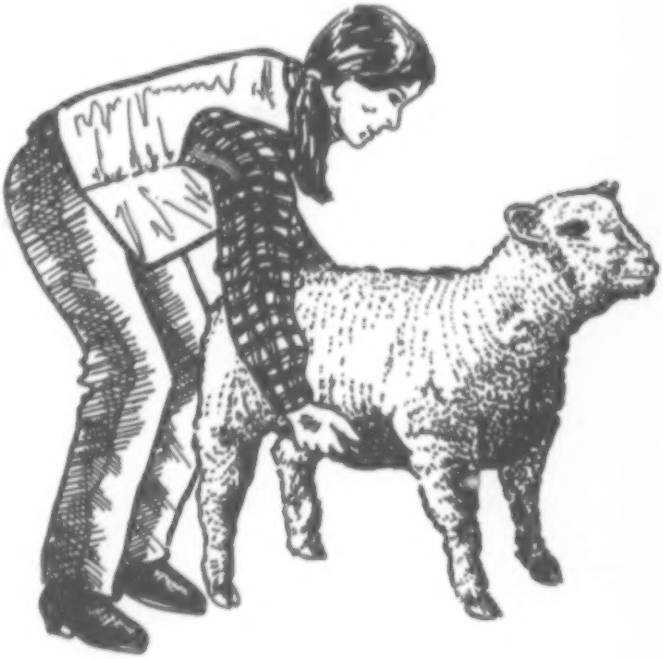
- Young lamb
- Worktable

PROCEDURE

Functional Reading Skills
- Follow written instructions

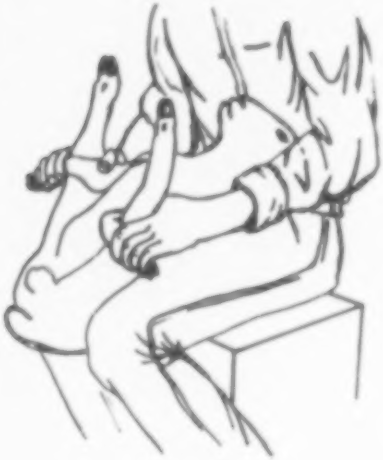
Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

1. Catch the lamb by the flank.



2. Hold the lamb with its back against you and its head up.
3. Bring the front legs of the lamb down and hook them over each hind leg.

4. Rest the rump of the lamb on the worktable.



5. Have instructor check your work.

6. Clean up work area.

PRACTICAL TEST 1

ANIMAL PRODUCTION

VIII

JOB SHEET 1

Use flank casting and castration restraint on cattle.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Roped the calf	___	___
2. Approached the calf without overexciting it	___	___
3. Reached across the calf's back and grasped the hindflank and front leg with hands	___	___
4. Lifted the calf from the ground with arms pulling on the hindflank and front leg and knees pushing on the calf's side	___	___
5. Eased the calf down with the weight against student's legs	___	___
6. Released the hindflank quickly and grasped the front leg with both hands	___	___
7. Placed one knee on the neck and the other knee behind the shoulders, facing the calf's front leg	___	___

8. Pulled the calf's front leg up toward the student's stomach ___ ___

9. Grabbed the upper hind leg at hock and ankle with hands and pulled it back from the calf ___ ___

10. Sat down behind the calf with one leg out toward the calf's rump and the other leg pushing the bottom hind leg of the calf just above the hock, moving the calf's leg as far forward as possible ___ ___

11. Used proper tools correctly ___ ___

12. Performed steps in a timely manner ___ ___

13. Practiced safety rules throughout procedure ___ ___

14. Provided satisfactory responses to questions asked ___ ___

15. Put away tools and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed flank casting	4	3	2	1
Completed castration restraint	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 2

Use vaccination or castration restraint on small pigs.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Grabbed the pig by the hind legs	___	___
2. Picked the pig up off the ground, pulling the pig toward the student's body	___	___
3. Performed steps in a timely manner	___	___
4. Practiced safety rules throughout procedure	___	___
5. Provided satisfactory responses to questions asked	___	___
6. Cleaned work area	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed vaccination or castration restraint	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3

ANIMAL PRODUCTION

VIII

JOB SHEET 3

Use castration and docking restraint on small sheep.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Caught the lamb by the flank	___	___
2. Held the lamb with its back against the student and its head up	___	___
3. Brought the front legs of the lamb down and hooked them over each front leg	___	___
4. Rested the rump of the lamb on the worktable	___	___
5. Performed steps in a timely manner	___	___
6. Practiced safety rules throughout procedure	___	___
7. Provided satisfactory responses to questions asked	___	___
8. Cleaned work area	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed castration and docking restraint	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

ANIMAL PRODUCTION

VIII

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with animal production to their definitions. Write the correct letter in the blank.

Part I

_____ 1. Cattle less than one year old

_____ 2. Mature female cattle

_____ 3. Feed that contains all the necessary nutrients to meet the animal's requirements for a 24-hour period

_____ 4. Female sheep

_____ 5. Female swine that have not produced offspring

_____ 6. Male swine that reached maturity before castration

_____ 7. Mating animals of different breeds

_____ 8. Male swine that are castrated before maturity

_____ 9. The amount of muscle and physical structure of an animal

_____ 10. Identifying inferior animals and removing them from the herd

a. balanced ration

b. capital

c. polled

d. ewes

e. calves

f. bucks

g. stags

h. cows

i. castration

j. confirmation

k. barrows

l. culling

m. infertile

n. crossbreeding

o. gilts

May be photocopied for student use.

Part II

_____ 1. Swine giving birth

_____ 2. Female cattle that have not produced offspring

_____ 3. Pertaining to cattle

_____ 4. Male cattle castrated after maturity

_____ 5. Pertaining to horses

_____ 6. Male cattle castrated before maturity

_____ 7. Male swine that are not castrated

_____ 8. Animals put on feed for increased growth

_____ 9. Sheep less than one year old

_____ 10. Financial resources

_____ 11. Male cattle that are not castrated

a. feeder animals
b. heifers
c. finish
d. bulls
e. bovine
f. slaughter
g. farrowing
h. wethers
i. capital
j. boars
k. pedigree
l. bullock
m. steers
n. lambs
o. filly
p. equine

May be photocopied for student use.

Part III

_____ 1. The amount of fat on an animal

_____ 2. The history of an animal's parents and previous generations

_____ 3. Male sheep that are not castrated

_____ 4. Female swine that have produced offspring

_____ 5. Animals that are managed and used for the benefit of man

_____ 6. Removal of the testicles to prevent reproduction

_____ 7. Bred for no horns

_____ 8. Young pig

_____ 9. Male sheep that have been castrated

_____ 10. Pertaining to swine

a. castration
b. polled
c. porcine
d. ewes
e. finish
f. livestock
g. rams
h. cows
i. farrowing
j. pedigree
k. heifers
l. wethers
m. equine
n. shoat
o. sows

May be photocopied for student use.

OBJECTIVE 2

Select from a list true statements about the overall process of raising livestock. Write an "X" in the blank before each true statement.

_____ 1. Food, medicines, synthetics, and many other everyday products come to us from animals raised specifically for each purpose.

_____ 2. The animal producer begins by assessing the herd already in place.

_____ 3. Animal production is one of Oklahoma's most important industries.

_____ 4. Animal products benefit us as a whole more than individually.

_____ 5. Day-to-day care includes providing feed, shelter, water, and disease control.

_____ 6. Food, medicines, synthetics, and many other everyday products come to us from the many different animals raised commercially.

_____ 7. Animal production brings more than $2 billion and thousands of jobs into the state each year.

_____ 8. The animal producer begins by selecting a breed and choosing seed stock.

_____ 9. Although animal production is a major industry in America, it is relatively small in Oklahoma.

_____ 10. Individually, we all benefit from animal products.

_____ 11. After sale, most animals are slaughtered for their meat and hide.

_____ 12. In some cases, animals are not slaughtered after sale.

OBJECTIVE 3

List assets and activities needed to manage a livestock operation. List four assets and activities in the space below.

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

May be photocopied for student use.

OBJECTIVE 4

Discuss U.S. and worldwide livestock. Describe two traditional U.S. and two traditional worldwide livestock animals and how they are used.

____

____

____

____

____

____

OBJECTIVE 5

List factors affecting choice of breed. Write seven factors in the space below.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________

May be photocopied for student use.

OBJECTIVE 6 **Choose the word or phrase that completes statements about new meat technologies.** Write the correct letter in the blank.

_____ 1. Two recent advances are implants and

a. immunizations
b. screening
c. hormone treatments
d. cloning

_____ 2. Implants stimulate the animal's

a. brain
b. digestive system
c. endocrine gland
d. pituitary gland

_____ 3. Crossbreeding and new technologies have increased

a. production costs
b. meat safety
c. the amount of usable meat on a carcass
d. carcass fat

_____ 4. The bovine growth hormone BST has been shown to increase

a. milk production
b. meat production
c. overall growth
d. hardiness

_____ 5. Designer meats, such as steak fingers, chicken nuggets, and turkey hams meet consumer demands for

a. low cost, convenience, and nutrition
b. low cost, variety, and convenience
c. flavor, variety, and low cost
d. convenience, variety, and nutrition.

NOTE: Objectives 7-12 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

ANIMAL PRODUCTION

VIII

OBJECTIVE 1

Part I	Part II	Part III
1. e	1. g	1. e
2. h	2. b	2. j
3. a	3. e	3. g
4. d	4. l	4. o
5. o	5. p	5. f
6. g	6. m	6. a
7. n	7. j	7. b
8. k	8. a	8. n
9. j	9. n	9. l
10. l	10. i	10. c
	11. d	

OBJECTIVE 2

3, 5, 6, 7, 8, 10, 11, 12

OBJECTIVE 3

Answers should include any four of the following:

- Capital
- Feed/forage
- Fencing
- Labor
- Land
- A market
- Records
- Seed stock
- Shelter
- Specialized tools and machinery
- Veterinary care/vaccinations
- Water

OBJECTIVE 4

Answers should include any two of these traditional U.S. animals:

- Beef and dairy cattle
- Swine
- Sheep
- Horses
- Poultry
- Goats

Answers should also include any two of these traditional worldwide animals:

- Camels
- Oxen
- Yaks
- Llamas
- Alpacas
- Reindeer
- Other worldwide traditional animals discussed in class.

The appropriate use of each animal should also be listed. Possible uses include:

- Pet/recreational use
- Research
- Meat, hide, and dairy production
- Transportation
- Labor

OBJECTIVE 5

Answer should include any seven of the following:

- Location - the breed should produce well in your area.

- Climate and terrain

- Adequate forage to support the breed

- Adequate water supplies

- Market demands - if there is no demand for the breed you choose, you will have difficulty selling your stock.

- Market trends

- Breeding stock - you will need to be sure breeding stock is available and at a price that is reasonable.

- Facilities - you will need to be able to afford to purchase facilities if you do not have them or improve the ones you have periodically.

- Tools and equipment - you will have to purchase items you do not have.
- Costs of feed, veterinary care, etc.
- Time necessary to show a profit

OBJECTIVE 6

1. c
2. d
3. c
4. a
5. d

OBJECTIVE SHEET

AGRICULTURAL PRODUCTS AND PROCESSING

IX

INTRODUCTION

Most of us don't whittle toothpicks out of tree limbs or grind our own flour. Instead, we purchase ready-made products. Today we can buy spaghetti already cooked, cotton already woven into cloth and sewn into jeans, and grapes already cooked into jelly. Unlike past generations, we rely on processing and transportation for nearly every agricultural product we use.

Because of processing, manufacturers can tailor their products to meet the tastes or needs of their customers. For example, as microwave ovens became more common, individual servings and main dish meals were processed and sold. As more home computers were purchased, continuous-form paper became more available. As consumers, we get what we want and save time, energy, and even money.

Who knows where this technology will lead? Someday we may simply feed a menu into a computer and have fabricated foods instantly appear. Whatever the future holds, consumers will continue to prefer finished products to raw products, making processing an important and growing industry.

UNIT OBJECTIVE

After completing this unit the student will be able to recognize stages of production, production and packaging technology, and the role of transportation. The student will demonstrate these competencies by completing assignment sheets, a job sheet, a practical test, and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with agricultural products and processing to their definitions.
2. Distinguish among the stages of production.
3. List manufacturing processes associated with agricultural products.
4. Select from a list the purposes of packaging.
5. Select from a list true statements about the role of transportation.
6. Name the bootmakers. (Assignment Sheet 1)

7. Compare generic and name brand products. (Assignment Sheet 2)

8. Design and build a package. (Job Sheet 1)

SUGGESTED ACTIVITIES

AGRICULTURAL PRODUCTS AND PROCESSING

IX

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Review the unit and plan your presentation.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Invite representatives from agricultural product processing facilities to discuss unit information.

  NOTE: Supply guest speakers with the objective sheet, information sheets, and any other components you want them to cover.

- Arrange to have cans of generic and name brand peaches and green beans available for taste testing (Assignment Sheet 2). Make sure plates/bowls and soda crackers are also available.

- Allow students two weeks to complete their egg packages (Job Sheet 1). Set aside at least one class period for the actual egg drop. You may want to consider asking for an extended class period or scheduling the drop for a weekend to allow parents and other students to participate or attend.

- Invite egg package judges and/or guests.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with agricultural products and processing to their definitions.

- It may be necessary to include additional terms, depending upon the details presented to the class.

- Have students define processes they are familiar with such as freezing, canning, drying, or pickling. If they are unable to explain how or why each process works, have them look up the information in the school library.

Objective 2: Distinguish among the stages of production.

- Have students list the steps in each stage of production of every item on a hamburger: the bun, meat, mustard, pickles, etc.

- Visit a local production operation where students can see production steps in progress.

Objective 3: List manufacturing processes associated with agricultural products.

- Have students list examples of each type of product covered in the information sheets and how each was processed.

- Have students list types of agricultural products not listed here and production technology affecting each.

- Assign one raw product to each student. Ask them to visit a grocery store and list at least six processed products containing their raw product.

Objective 4: Select from a list the purposes of packaging.

- Have students collect examples of different types of packaging. As each is brought to class, the students should identify its purpose and special features.

- Have students visit a grocery store or agriculture product warehouse to see how packaging affects easy storage and transportation.

- Have students compare primary and secondary packaging.

- Have students design a new package for a non-traditional agricultural crop.

- Have students complete Job Sheet 1.

Objective 5: Select from a list true statements about the role of transportation.

- Have students list all the vehicles they see in one day that are used to transport food.
- Explain the effect of transportation on product prices.
- If possible, allow students to visit and view a tractor-trailer or railroad car.
- Have students list ancient methods of transportation.
- Have students list forms of transportation not usually used in the United States, but used in other countries.
- Have students suggest packaging and transportation problems associated with space travel.

APPLICATION

Objective 6: Name the bootmakers.

- Have students compare careers associated with cowboy boots to those associated with socks or athletic shoes.
- Use Transparency Master 1 to show the diversity of agriculture products in everyday use.
- Have students complete Assignment Sheet 1.
- Allow students to work in teams and offer a prize to the team with the greatest number of careers.
- Have students identify those careers that are agricultural and those that are agriculture-related.

Objective 7: Compare generic and name brand products.

- Do not let the students see you pour the products into the bowls.
- Label each bowl with a number i.e., Peaches #1.
- Expand the variety by including store brands or home-canned products.
- Explain to students that they need to taste a cracker before each sample to cleanse the palate.
- If a student dislikes both samples but claims to like the product, ask what brand they use at home.

- If the generic and name brand products are visibly different, for example, if the green beans are cut differently, blindfold students before they taste samples.
- Explain to students that taste can reflect only personal preference, not quality. For example, some people prefer the taste of margarine to the taste of butter. New margarines that taste like butter will not appeal to them.
- Let students conduct a similar taste test for the student body. Use generic soda crackers or cookies.
- Have students complete Assignment Sheet 2.

Objective 8: Design and build a package.

- Change guidelines as desired. Weight limits are sometimes added as a safety precaution; material selection may be limited.
- Do not suggest or supply ideas or materials. This is a creative, problem-solving exercise.
- Allow students to work in teams or as individuals.
- A drop of at least 25 feet onto a hard surface is recommended. The shorter the drop, the more rounds will be required.
- Invite an engineer to discuss why certain designs work better than others.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheet to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.

- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Food: Its Science, Your Future.* Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709, 800-243-MTPS. Highlights the role of food technologists in preserving our food to keep us productive and healthy. Introduces the various career opportunities available in the growing field of food science and technology: product development, food processing, quality control, regulatory compliance, and package design. Available on a free-loan basis. (20 minutes, color, VHS or 16 mm film)
- *From Blue Jeans to Ice Cream.* Alabama Farmers Federation, P. O. Box 11000, Montgomery, AL 36198. A group of junior high 4-H students set out to research where ice cream and blue jeans come from and find some very interesting origins. (14 minutes, color, VHS)
- *The Great Green Bean.* Yamhill County women for Agriculture, P. O. Box 101, Dayton, OR 97114. Presents information about green bean production, processing, and sales. (15 minutes, color, VHS or slides)
- *Meat, Poultry, and Fish Processing.* Hobar Publications, 1234 Tiller Lane, St. Paul, MN 55112. Discusses careers associated with meat, poultry, and fish processing. (10 minutes, color, VHS)

- *Who Gets Your Food Dollar.* Wisconsin Farm Bureau Federation, 7010 Mineral Point Road, Box 5550, Madison, WI 53705. Explains how the food dollar is divided and different levels of the farmer-to-customer system. (Slide set with script)

Print Media

- *Corn Touching Our Lives Every Day.* Illinois Corn Marketing Board, 2415 E. Washington Street, Bloomington, IL 61704. Details uses of corn made possible by modern technology and processing.
- *Play It Safe: Goals for Food Safety.* Food Marketing Institute, Publication Sales Department, 1750 K Street, NW, Washington, DC 20006. Discusses the responsibilities of the food industry, government, and consumers in food safety.
- *The Source.* New York Agriculture in the Classroom, Cornell University, 111 Kennedy Hall, Ithaca, NY 14853. Discusses where foods come from and the uses of plant and animal products.
- Meat Identification Charts for beef, pork, and veal. Order from the Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, 1500 W. Seventh Avenue, Stillwater, OK 74074.

UNIT REFERENCES

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- Marcouiller, Dave. Oklahoma State University, Stillwater, OK. Interview, 1991.
- Potter, Norman N. *Food Science.* Van Norstrand Reinhold International: New York, 1986.

- Ray, Fred. Oklahoma State University, Stillwater, OK. Interview, 1991.
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INFORMATION SHEET

AGRICULTURAL PRODUCTS AND PROCESSING

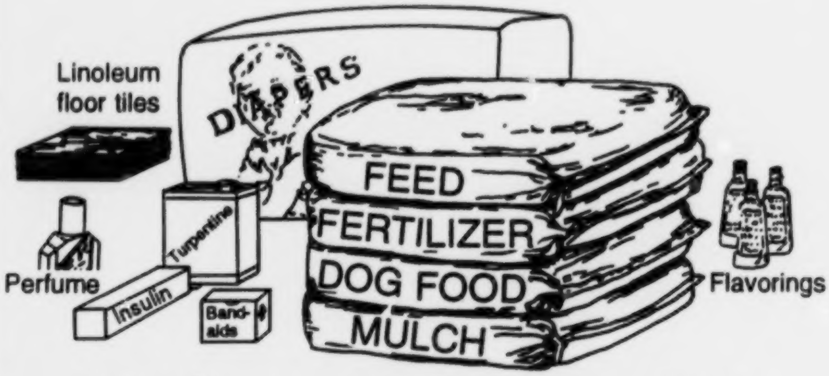
IX

OBJECTIVE 1

Match terms associated with agricultural products and processing to their definitions.

- **by-products** – parts of the agricultural product other than the main product; waste, scraps

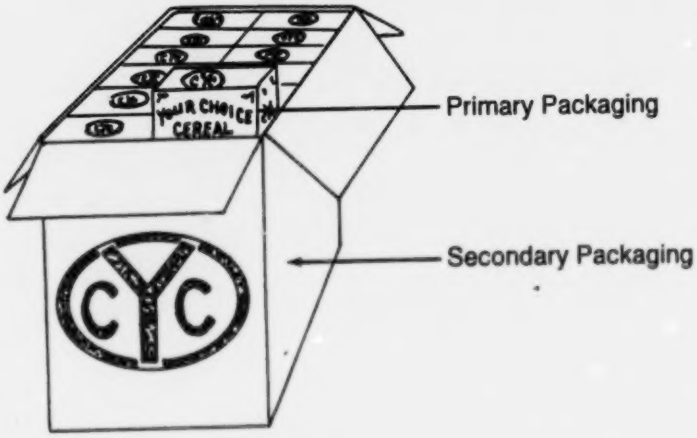
  EXAMPLE: Hooves and bone from animal products, grain hulls, wood chips, egg shells, orange peelings


Linoleum floor tiles
DIAPERS
FEED
FERTILIZER
DOG FOOD
MULCH
Perfume
Turpentine
Insulin
Band-aids
Flavorings

Products that may seem like waste can be put to valuable use.

- **clarification** – the straining process of cleaning unprocessed milk
- **dressing** – removing the hide from an animal carcass
- **grading** – determining a product's quality by comparing it to industry standards
- **homogenization** – the mixing process that prevents cream from separating from the milk
- **pasteurization** – the process of heating milk to remove harmful bacteria

- **primary packaging** – the packaging used by the consumer



- **secondary packaging** – the packaging used by the processor, wholesaler, and retailer

- **tamper-resistant packaging** – packaging designed to prevent access to the product before it is purchased

OBJECTIVE 2

Distinguish among the stages of production.

There are three stages of production: pre-processing, processing, and post-processing. It may be easiest to think of them as **before**, **during**, and **after**. The crop or product can be damaged or spoiled during all three stages. Therefore, protecting the product in all stages is always an important goal.

Pre-processing is anything affecting the crop **before** processing. Examples of pre-processing include:

- A field of wheat

- Fish in a fish farm tank

- A stand of trees

During pre-processing, the size and quality of the raw materials are the main concerns. Harvesting, storing, and transporting the raw materials are also important.

Processing is the stage **during** which the raw materials are made into a desired product. Processing steps include the following:

- Wheat being harvested

- Fish being made into fish sticks

- A sawmill cutting trees into lumber
- Corn being ground into meal

During the processing stage, efficient use of time, labor, technology, and by-products are the main goals of the processor. The product must be processed and packaged in a way that makes people want to buy it. Consumer demands and new advances in machinery and technology can affect processing.

EVERYTHING IS USED BUT THE MOO

Processors hate waste. Very few "scraps" are disposed of. Instead almost every part of the product is used in one way or another. When an animal is slaughtered, for example, the blood and bone are used in dog food; the hormones are used to make medicine for humans and other animals, and the ear hair is used in paint brushes.

The list of by-products and their uses grows daily and includes some items you might never consider ag-related. For example, linoleum is made from wood and animal by-products. More detailed information about by-products can be found in other units.

The post-processing stage is concerned with what happens to the product **after** it is processed. Examples of post-processing include:

- Stocking loaves of bread on a grocery store shelf
- Shipping boxes of fish sticks to the grocery store in refrigerated trucks
- Stacking 2x4's in a lumber yard

During post-production, products are transported and stored. They may be shipped to wholesalers, retailers, or warehouses for storage and sale.

OBJECTIVE 3 **List manufacturing processes associated with agricultural products.**

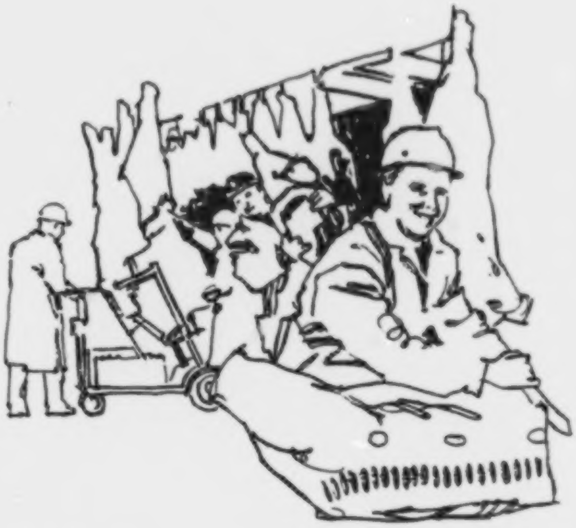
Think about the last time you had fried chicken. Did your grandmother fry it up for you? Or maybe your dad stopped for take-out. Or maybe you got a frozen dinner out of the freezer and popped it into the microwave. Now consider what it would take to fry a chicken without processing. Fat would have to be rendered when another animal is slaughtered. Spices would have to be grown, dried, and ground. Wheat would have to be grown, harvested, threshed, and ground into flour. Eggs would have to be laid and the cow milked. Having done all of that, the chicken would have to be killed, plucked, and butchered. Unless you have done all of these things, every piece of fried chicken you have ever eaten has been processed to some degree.

Today, nearly all agricultural products are processed for use and convenience.

As technology changes consumer demands and processing also changes. For example, from 1991 to 1994, sales of frozen, prepared microwavable foods will grow by 25 percent and deli sales will decrease by 22 percent. Technology of the future may include magnetic waves that keep food fresh, ovens that analyze moisture content, and robots that assemble fast foods.

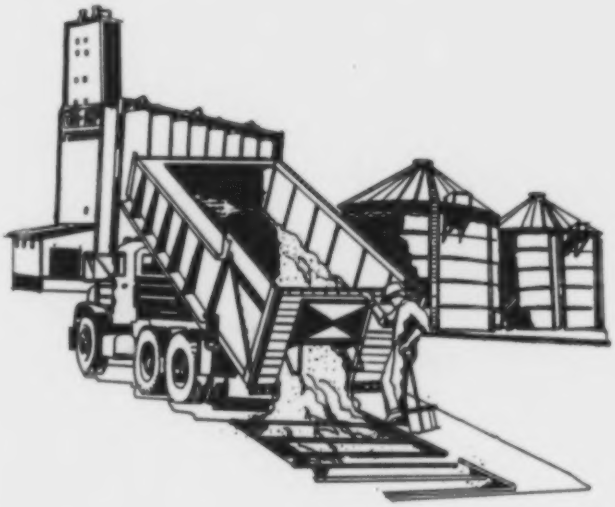
Many processes must be completed before your chicken is ready to fry or your steak is ready to grill. Manufacturing processes for meat and poultry include:

- Slaughtering
- Grading
- Dressing
- Cutting
- Cooking and/or breading
- Forming into "designer meats" such as steak fingers or patties
- Canning
- Drying (jerky)
- Aging



Grains require varying amounts of processing. Some grains are sold whole and others require several more stages of processing. Storing grain requires careful control of insects, temperature, moisture, mold, and sprouting. Processes associated with grains include:

- Harvesting
- Threshing
- Hulling
- Sieving
- Milling



Fruits and vegetables are often processed less than other food products, such as grains. Large warehouses for storage of fruits and vegetables have temperature and atmosphere controls to keep them fresh longer.

DO YOUR ORANGES GLOW IN THE DARK?

Many foods, including meats, fruits and vegetables, and other agricultural products can be preserved many ways. Some are old, but technology has also created new methods, such as irradiation.

Before you panic, understand that this method is safe. During irradiation, foods are exposed to low doses of radiation that kill microbes that cause spoilage. Larvae and microbes are killed, but the radiation doses are low enough that no other change occurs in the product. The shelf life is only extended a few days, and the radiation does not affect the consumer.

In Europe, irradiation is common. Irradiated foods display a symbol, so consumers know what they are buying. In the United States, irradiation is not as common because consumers are worried about side-effects. Potatoes and herbs were the first foods approved by the Food and Drug Administration to be irradiated. Pork, grains, tropical fruits, and strawberries can also be irradiated.

Processing for fruits and vegetables includes:

- Picking
- Grading
- Sorting
- Packaging of fresh items for protection
- Canning
- Juicing
- Drying
- Freezing

Strange as it may seem, we owe many of our food-preservation techniques to Napoleon's wars. Some basic techniques, such as salting, drying, and pickling, were well known for centuries, but were done by each individual family. When the wars took many farmers from their land and destroyed many crops, the population began to starve. Napoleon also had to feed his army. As a result, the first drying factories were built. A British candymaker's new preservation method, canning, was also used commercially. Napoleon is even credited with distributing the first margarine (suet mixed with milk).

Ironically, food was also his downfall. After his troops ran out of food during their retreat from Moscow, he was removed from command and forced to leave France. He returned to France during "The 100 Day Reign," and routed his troops to Waterloo, where crops were being harvested. The British attacked him there and he suffered one of the worst defeats in history.

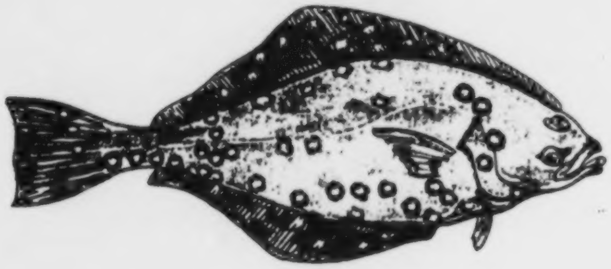
Dairy products require varying amounts of processing depending on the product. Milk, for example, requires less processing than cheese. First, the milk is processed, then it can be further processed into such products as cheese, ice cream, and yogurt. Dairy processes can include:

- Clarification and straining
- Homogenization
- Pasteurization
- Fat removal (for skim and low-fat products)
- Fermenting (yogurt)
- Aging
- Drying

After a fish is caught or harvested, it can be sold fresh or it can be processed. Processing of fish can include:

- Cleaning
- Cutting
- Freezing
- Smoking
- Canning

- Drying
- Forming into "designer" cuts such as fish sticks



Salting fish to preserve it is one of the oldest forms of processing known to man. Fish has also been dried for centuries. In many countries, such as Japan, dried fish is a snack, similar to our potato chips. As late as 1991, there were no standards for quality in fish. Legislation may be enacted to require USDA inspection and quality control.

Many agricultural products are not food products. Forestry products and textiles fall into this category. Paper products and chemicals, such as turpentine are processed from wood. Forestry processing includes:

- Harvesting
- Cutting
- Forming into products such as paper, turpentine, etc.
- Replanting

Textiles also require specialized processing. It takes several different processes to make raw cotton into blue jeans. These processes include:

- Picking
- Cleaning
- Spinning
- Dying
- Weaving

You've all learned that Eli Whitney's cotton gin removed the seeds from cotton and made processing it easier and more profitable. You probably studied it in history, because the effect of the cotton gin on the cotton market made the Civil War more unavoidable. Even today, the cotton gin, basically unchanged, is used for all cotton processing. Few inventions have been as important as the cotton gin. But Eli Whitney didn't invent it. A woman did.

Her name was Mrs. Catherine Littlefield Greene. She designed, perfected, financed, and marketed the cotton gin. She hired Mr. Whitney to "help" her. At that time, many inventions developed by women were credited to men, because it was believed nobody would buy a woman's invention.

OBJECTIVE 4 **Select from a list the purposes of packaging.**

After processing, all agricultural products are packaged. Even fresh products are packaged to protect them from damage and to make transportation easier. Types of packaging vary widely. For example, lumber may be strapped into bundles, cloth wound around bolts or spools, flour bagged, and turkey dinners sealed in microwavable plates and cardboard boxes.

Packaging serves several purposes:

- Protects the product from contamination, dirt, insects, and damage

  NOTE: Packing materials must not contaminate the product.

- Keeps moisture in or out
- Keeps gasses in or out
- Attracts the customer's eye to promote sales

  NOTE: Packaging is part of the marketing for the product. Name brand, special promotions or features, and the label design are carefully tested and selected to increase sales.

- Makes the product easy to use (easy to open, includes a pour spout, resealable, etc.)
- Is used for transportation and storage; fulfills transportation and storage requirements (strong, lightweight, stackable)
- Is suitable for retail display and sales. The package can carry printed information clearly, contain a sellable amount of the product, be attractive, etc.

- Meets the special needs of the product. For example, fruit is wrapped and layered to protect it from bruising.
- Protects against tampering

  NOTE: Tamper-resistant packaging was developed because customers sometimes opened products and left them on the shelf. The opened containers couldn't be sold, so packagers developed containers to help retailers. Then, in 1982, there was a series of deaths caused by product tampering. In the most publicized cases, cyanide was added to packages of Tylenol as they sat on supermarket shelves. Seven people in the Chicago area died. After that, state and federal governments passed laws requiring tamper-resistant packaging.

OBJECTIVE 5

Select from a list true statements about the role of transportation.

Nobody knows who invented the wheel or the sailboat. What *is* known is that as soon as man could travel, he began trading. And when trading began, people began transporting agricultural products. Spices, grains, and delicacies like snails and seafood were transported centuries ago. Cultures that could transport foods and trade or sell them, could specialize in raising cash crops, rather than growing only the foods they needed for survival. Farming families could bring their products to market and barter or sell them, just as we see at farmer's markets or truck-farming stands today.

Why are truck farms called truck farms? Because farmers use trucks to transport the food for sale, right? WRONG! "Truck" is taken from the French "troquer" which means "to exchange." That's what French truck farmers did: exchanged food for money or other goods.

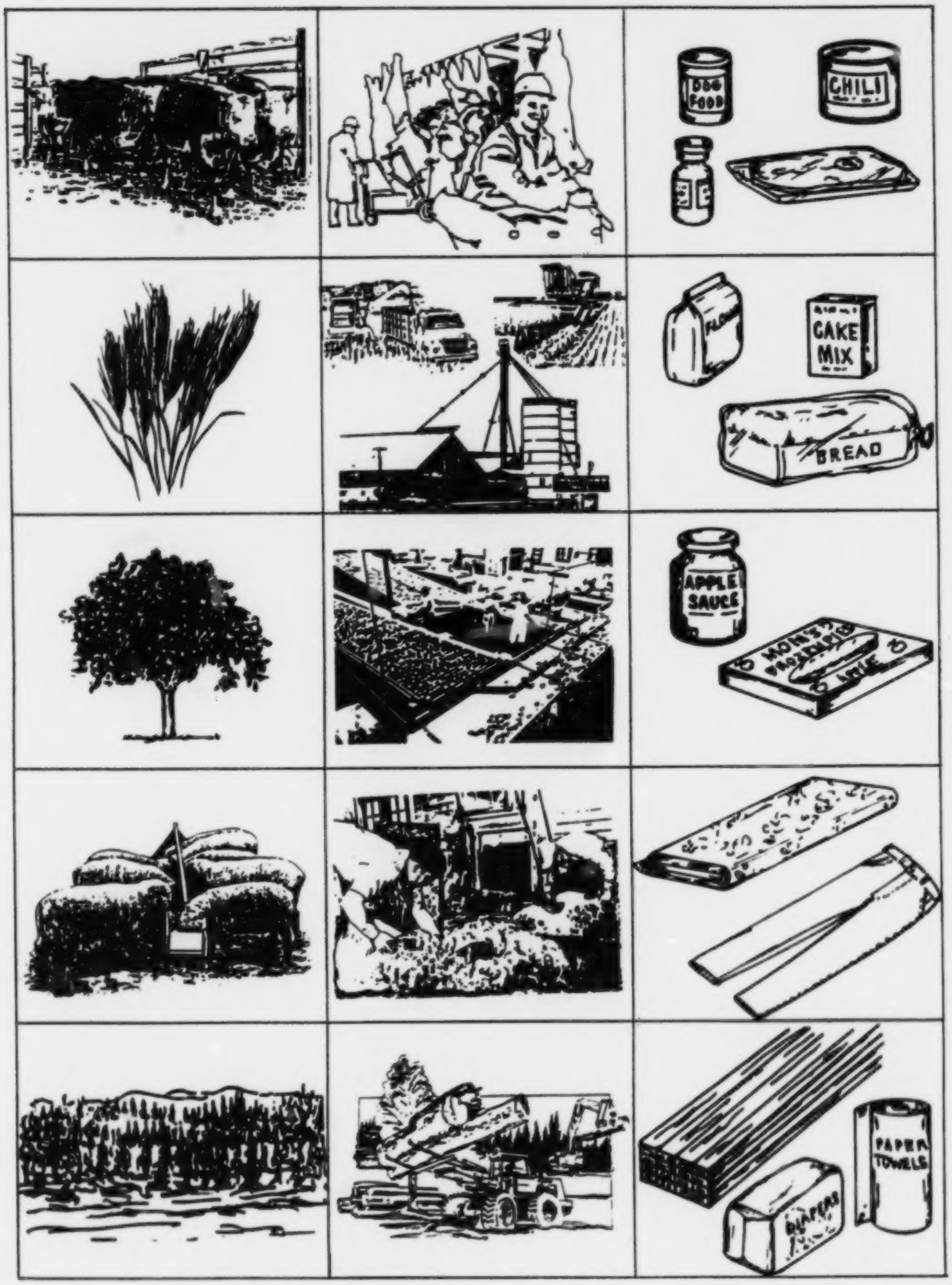
Transportation provides us with a variety of products. We get grain from America's heartland, shrimp from the Gulf of Mexico, cotton from the South, and fruit from the Sunbelt. Without the ability to transport products, we would only eat what we could grow in our area.

Most agricultural products are transported by trucks, railroad, or ships. Some products are shipped by air. For example seafood is flown to markets because it should be sold as soon as possible. Fees, fuel prices, and other transportation costs affect retail prices.

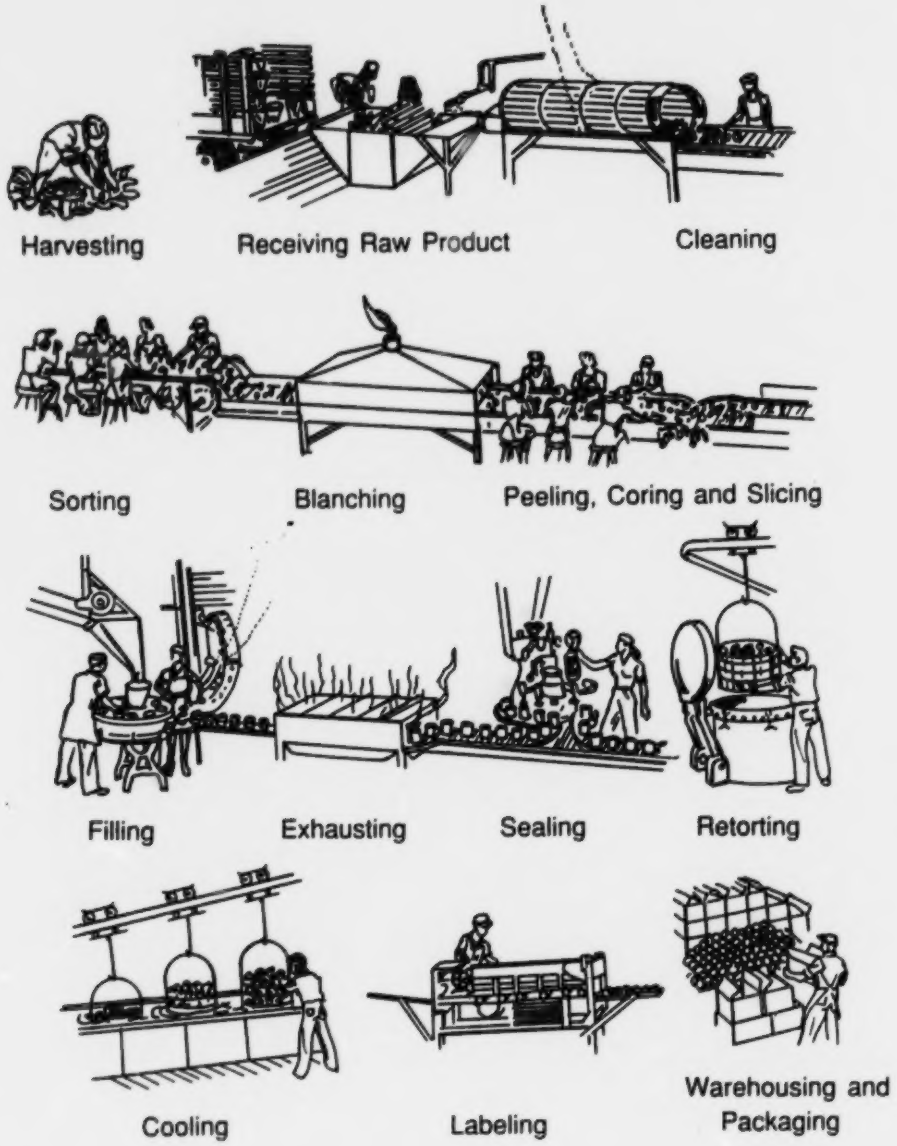
Specially designed trucks and railroad cars protect the temperature and atmosphere in which products are shipped. The size and weight of the secondary packaging is designed for quick, efficient packing in railroad cars and tractor-trailers.

In the late 1800s, the central states were the major producers of strawberries which were considered delicacies. Railroads made shipping and raising them boom industries. After North American varieties were cross-bred with stronger, South American plants, the crop spread nationwide.

PRE-PROCESSING, PROCESSING, AND POST-PROCESSING


DOG FOOD
CHILI
FLOUR
CAKE MIX
BREAD
APPLE SAUCE
PAPER TOWELS
DIAPERS

TYPICAL CANNING FACTORY SET-UP



Harvesting

Receiving Raw Product

Cleaning

Sorting

Blanching

Peeling, Coring and Slicing

Filling

Exhausting

Sealing

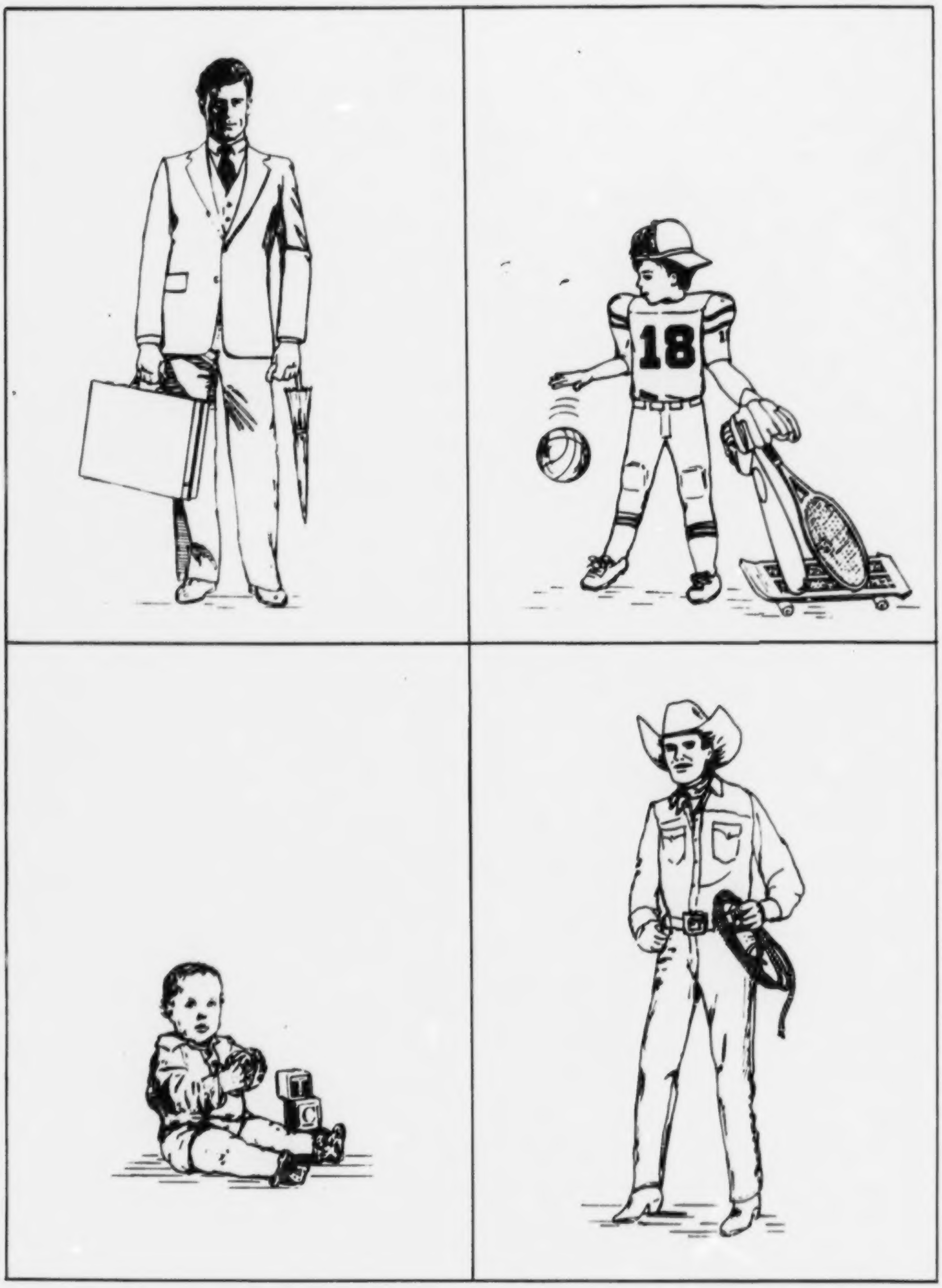
Retorting

Cooling

Labeling

Warehousing and Packaging

Adapted with permission of American National Can Company, Chicago, Illinois.



TRANSPARENCY MASTER 1 - 8th Grade Agriculture
CIMC - IX - 27

ACTIVITY SHEET 1

Development of:
READING SKILL
WRITING SKILL
CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading writing, and creative thinking and problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILL

  - Using magazines and newspapers

  WRITING SKILL

  - Constructing graphics and symbols

  CREATIVE THINKING AND PROBLEM SOLVING

  - Collecting/recording information
  - Analyzing/synthesizing information

- If students have difficulty using magazines and newspapers:
  - Examine the structure of the magazine or newspaper.
  - Discuss the goals and perspectives of various magazines or newspapers.
- If students have difficulty constructing graphics and symbols:
  - Suggest they examine a variety of graphics.
  - Discuss the elements of a good graphic display.
- If students have difficulty collecting/recording information:
  - Discuss what information is needed.
  - Suggest they examine their sources carefully noting the key words or ideas.

- If students have difficulty analyzing/synthesizing information:
  - Remind them that to analyze material they must break it down and examine each component or area.
  - Remind them that to synthesize material they must arrange all the components in a way that is useful to them.

Research and Reference Skills
- Use magazines and newspapers

Composition Skills
- Construct graphics & symbols

Cognitive Activities Skills
- Collect/record information
- Analyze/synthesize information

MAKE A POSTER

Collect pictures of non-traditional agricultural products. Arrange and paste them on a poster board. Hang the poster in your classroom and add to it throughout the course.

Non-traditional agriculture products are "new" to the market or area. Hybrids, specialty, or unusual products can be considered non-traditional. Non-traditional products can become mainstream. Soybeans and peanuts are examples of this transition. Don't be fooled, though. Even rare products are big business. In 1991, exotic animals, such as ostriches and llamas, produces $1 billion worth of business.

ACTIVITY SHEET 2

Development of:
WRITING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why writing and creative thinking and problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Stating ideas clearly

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  - Collecting/recording information

- If students have difficulty stating ideas clearly:

  - Instruct them to organize their thoughts before they begin to write.

  - Instruct them to use simple, concise language.

- For additional suggestions on teaching basic skills refer to Instructional Supplement 1.

ACTIVITY SHEET 2

AGRICULTURAL PRODUCTS AND PROCESSING

IX

IDENTIFY PROCESSING STEPS FOR AREA CROPS

Choose an agricultural crop in your area and then do one of the following activities.

1. List examples of the steps involved in the pre-processing, processing, and post-processing of the crop.

or

2. Bring pictures or samples of the product in pre-processing, processing, and post-processing phases.

Language Skills
- State ideas clearly

Cognitive Activities Skills
- Collect/record information
- Analyze/synthesize information

ASSIGNMENT SHEET 1

Development of:
WRITING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why writing and creative thinking and problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILL

  - Stating ideas clearly

  CREATIVE THINKING AND PROBLEM SOLVING

  - Collecting/recording information
  - Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc.)

- If students have difficulty applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc.):

  - Define and demonstrate the techniques.
  - Have them practice the thinking techniques.

- For additional suggestions on teaching basic skills refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 1

AGRICULTURAL PRODUCTS AND PROCESSING

IX

Name ______________________________ Score __________

OBJECTIVE 6

Name the bootmakers.

INTRODUCTION

It can be easy to forget just how important agricultural industries are to our way of life. Even the simple things around us are supplied by agriculture. The pencil you are using, the paper this is printed on, the cotton in your socks, and the gum you might be chewing are based in agriculture.

DIRECTIONS

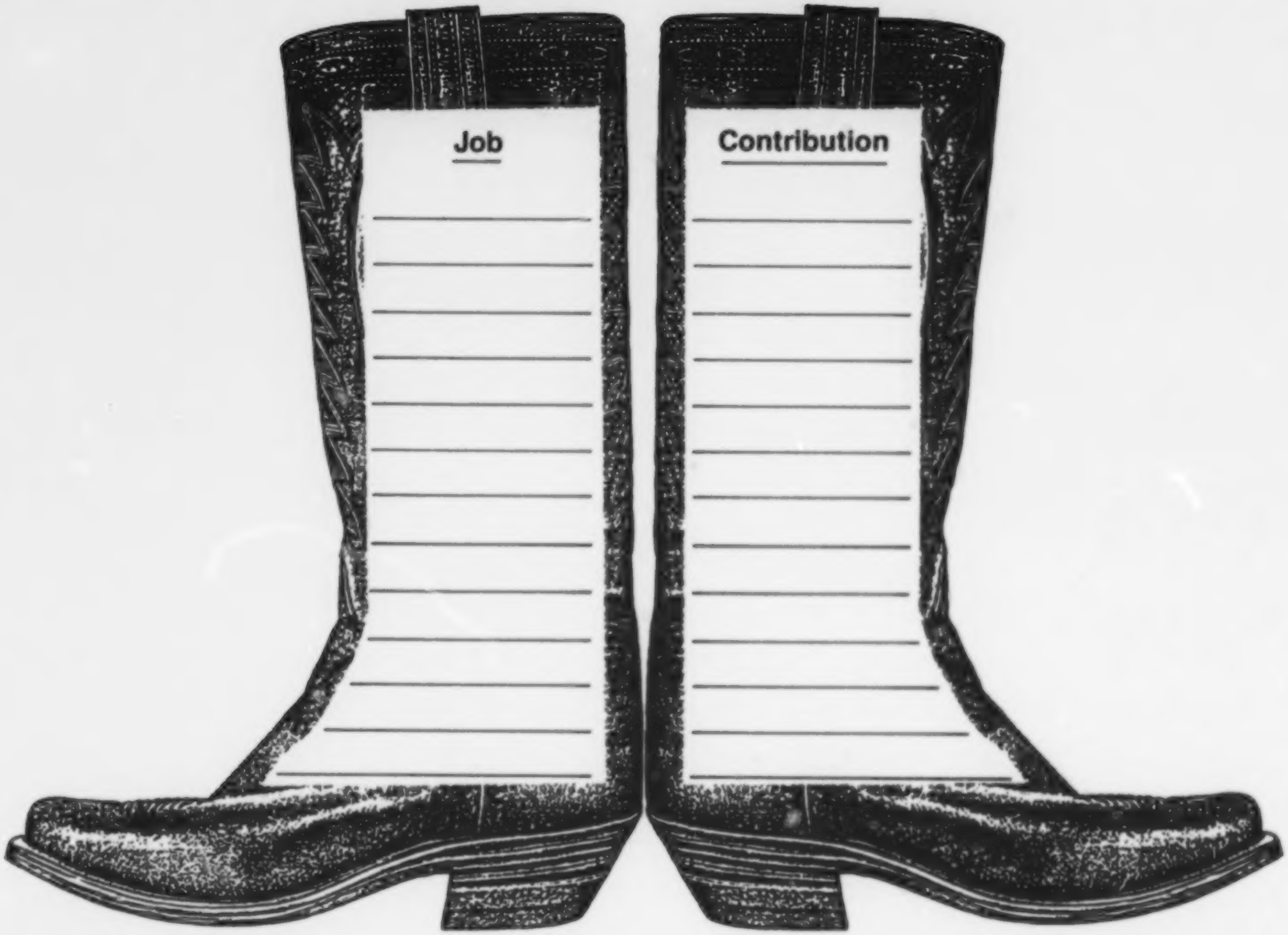
Use the next page to list the careers involved in the production of a pair of boots. Include everything from raising and providing raw materials to selling the product.

List the job and tell how it contributed to the boots.

EXAMPLE: Thread manufacturer - Made the thread used to sew the parts of the boot together

Language Skills
- State ideas clearly

Cognitive Activities Skills
- Collect/record information
- Apply intuitive thinking techniques


Job
Contribution

ASSIGNMENT SHEET 2

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, and creative thinking and problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Gaining factual information
  - Following written instructions

  WRITING SKILLS

  - Completing forms and records

  MATHEMATICS SKILLS

  - Calculating with whole numbers

  CREATIVE THINKING AND PROBLEM SOLVING

  - Collecting/recording information
  - Identifying critical elements/issues
  - Analyzing/synthesizing information
  - Drawing conclusions

- If students have difficulty gaining factual information, suggest they read carefully, noting key words and ideas.

- If students have difficulty following written instructions:
  - Discuss the importance of following instructions precisely.
  - Instruct them to read the instructions carefully, noting the key words.

- If students have difficulty completing forms and records, examine the structure of the forms being used.
- If students have difficulty calculating with whole numbers:
  - Review addition, subtraction, multiplication, and division facts.
  - Review mathematical terminology.
- If students have difficulty identifying critical elements/issues:
  - Suggest they construct a short outline of the material.
  - Suggest they read or examine the material carefully and ask themselves "What is the important point?"
- If students have difficulty analyzing/synthesizing information:
  - Remind them that to analyze material they must break it down and examine each component or area.
  - Remind them that to synthesize material they must arrange all the components in a way that is useful to them.
- If students have difficulty drawing conclusions:
  - Suggest they define what question they want to answer.
  - Instruct them to review their analysis and synthesis of the material.
- For additional suggestions on teaching basic skills refer to Instructional Supplement 1.

Name ______________________________ Score ____________

OBJECTIVE 7

Compare generic and name brand products.

INTRODUCTION

Grocery stores usually offer name brand and generic products. Name brand products are those produced and advertised by large companies. Generics are not marketed and advertised nationally, so they cost less. Some consumers believe the generic brands are a better buy, but others think low price means low quality. Are generics different from national brands?

DIRECTIONS

1. Your instructor will label the bottom of two plates/bowls "name brand" and two plates "generic." He or she will open cans of generic and name brand green beans and peaches and put them on the plates. You will not see the labels or see them poured, so you will not know which is which. Plates/bowls will be labeled green beans 1, green beans 2, etc.

2. Look at the cans. Grade each can from 1 to 10, 1 being the worst possible and 10 being perfect. Use the chart below.

	Name Brand Green Beans	Generic Green Beans	Name Brand Peaches	Generic Peaches
Eye Appeal				
Cost				
Nutritional Information				
Serving Information				

3. Look at the products. Grade them, using the same scale and the chart below.

	Green beans 1	Green beans 2	Peaches 1	Peaches 2
Appearance				
Color				
Smell				
Size				

4. Try to identify which products are name brand and which are generic.

Green beans 1 _____ Name brand _____ Generic
Green beans 2 _____ Name brand _____ Generic
Peaches 1 _____ Name brand _____ Generic
Peaches 2 _____ Name brand _____ Generic

5. Taste the products.

   a. Eat a bite of cracker.

   b. Taste a product.

   c. Complete the chart for that product using the same scale and the chart below.

   d. Repeat the cracker, taste, and grade pattern for the other three products.

	Green beans 1	Green beans 2	Peaches 1	Peaches 2
Taste				

6. Based on taste, which items do you think are name brand and which do you think are generic?

Green beans 1 _____ Name brand _____ Generic
Green beans 2 _____ Name brand _____ Generic
Peaches 1 _____ Name brand _____ Generic
Peaches 2 _____ Name brand _____ Generic

Reading Comprehension Skills
- Gain factual information

Functional Reading Skills
- Follow written instructions

Functional Writing Skills
- Complete forms & records

Operation and Calculation Skills
- Calculate with whole numbers

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues
- Analyze/synthesize information
- Draw conclusions

After your instructor tells you which items are generic and which are name brand, answer the questions below.

7. Did you guess which green beans were name brand and which were generic?

____

8. What differences did you see in appearance?

____

____

____

____

9. What differences did you taste?

____

____

____

____

10. Which product did you grade higher?

____

11. Did you guess which peaches were name brand and which were generic?

____

12. What differences did you see in appearance?

____

____

____

____

13. What differences did you taste?

____

____

____

____

14. Which product did you grade higher?

____

15. Ask your instructor for the prices on all the items. How did the name brand prices compare to the generic prices?

____

____

16. Which do you think was the better value? Why?

____

____

____

ASSIGNMENT ANSWERS — AGRICULTURAL PRODUCTS AND PROCESSING IX

ASSIGNMENT SHEET 1

Answers should be complete. Each student must be able to explain the relationship between the career and the boots. Do not limit the student to agricultural careers or to a certain time frame. For example, bookkeepers who keep records after the sale of the boots and the feed store clerk serving the cattle rancher are correct answers.

ASSIGNMENT SHEET 2

Check that students examined and graded the cans and the products, tasted the products and graded them, and completed the comparisons and questions.

JOB SHEET 1

Development of:
READING SKILLS
MATHEMATICS SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, creative thinking and problem solving, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Following written instructions

MATHEMATICS SKILLS

- Making measurements

CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Identifying critical elements/issues
- Analyzing/synthesizing information
- Identifying/developing alternatives
- Evaluating alternatives
- Selecting an alternative
- Devising a solution
- Creating a finished product
- Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc.)

EMPLOYABILITY SKILLS

- Mastering a specific job task/procedure
- Practicing good work habits/attitudes

- If students have difficulty making measurements:
  - Review the units of measure in the English and metric systems.
  - Determine which measurement system is used on the available equipment and demonstrate its use.
- If students have difficulty identifying/developing alternatives:
  - Suggest they use intuitive thinking techniques.
  - Suggest they discuss ideas and alternatives with other students.
- If students have difficulty evaluating alternatives:
  - Suggest they list all the pros and cons of each alternative.
  - Instruct them to eliminate all but the best two or three alternatives.
- If students have difficulty selecting an alternative:
  - Instruct them to review the pros and cons of each alternative.
  - Remind them that their first choice is just a starting point and can be modified as the project progresses.
- If students have difficulty devising a solution:
  - Analyze the problem.
  - Instruct them to use intuitive thinking techniques.
  - Analyze various solutions.
- If students have difficulty creating a finished product:
  - Discuss with them the importance of focusing on a main goal.
  - Suggest they make a list of steps to take in reaching that goal.
  - Discuss with them the fact that sometimes a first attempt may not work. They should be flexible and try a different alternative.
  - Suggest they delegate some of the responsibilities.

  - Suggest that they work one step at a time.

- If students have difficulty applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc.):

  - Define and demonstrate the techniques.

  - Have them practice the thinking techniques.

- If students have difficulty mastering a specific job task/procedure:

  - Emphasize the fact that practice makes a person proficient and proficiency makes a person confident.

  - Suggest they study each component of the task to determine which area is causing difficulty.

  - Review the entire procedure.

- If students have difficulty practicing good work habits/attitudes:

  - Review what is expected of the student.

  - Discuss the importance of good work habits/attitudes in obtaining and retaining employment.

- For additional suggestions on teaching basic skills refer to Instructional Supplements 3 and 4.

JOB SHEET 1

AGRICULTURAL PRODUCTS AND PROCESSING IX

OBJECTIVE 8

Design and build a package.

INTRODUCTION

Boxes, bags, crates, and tubs are simple packages. They're easy to use, cheap to make, and hold almost any amount. But what about products that need special care? How hard is it to make a package for something that isn't easily measured? And what if it can be easily damaged? How hard is it to build a container for that product? To find the answers to these questions and test your engineering skills, you and your classmates will conduct an egg drop. And yes, it can get messy.

EQUIPMENT AND SUPPLIES

- Miscellaneous construction materials
- Raw eggs
- A stopwatch
- A tall building

PROCEDURE

1. Design and construct a package that will hold one egg and protect it during transportation. You may use any material and design you like as long as it is within the following guidelines.
    - The package must measure no more than eight inches in any direction.
    - No parachutes or similar devices are allowed.
    - Metals may be used only for fasteners.
    - All packages must be able to be opened in 1 minute or less.
2. Have your instructor check your package and put a raw egg in it.
3. Your instructor will drop your package (and those built by your classmates) from the top of a building.
4. If your egg breaks, you are out of the competition.
5. All packages with unbroken eggs will be dropped again. This will be repeated until the most durable package is determined.
6. Put away tools and materials and clean the work area.

Functional Reading Skills
- Follow written instructions

Functional Math Skills
- Make measurements

Cognitive Activities Skills
- Identify critical elements/issues
- Analyze/synthesize information
- Identify/develop alternatives
- Evaluate alternatives
- Select an alternative
- Devise a solution
- Create a finished product
- Apply intuitive thinking techniques

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Practice good work habits/attitudes

633

JOB SHEET 1

Design and build a package.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Designed and constructed a package	___	___
2. Made sure the package measured no more than eight inches in any direction	___	___
3. Did not attach parachutes or similar devices	___	___
4. Used metals only for fasteners	___	___
5. Was able to open package in 1 minute or less	___	___
6. Used proper tools correctly	___	___
7. Performed steps in a timely manner	___	___
8. Provided satisfactory responses to questions asked	___	___
9. Put away tools and cleaned work area	___	___

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Designed and built a container that met all guidelines	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

AGRICULTURAL PRODUCTS AND PROCESSING

IX

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with agricultural products and processing to their definitions. Write the correct letters in the blanks.

_____ 1. The packaging used by the consumer

_____ 2. Parts of the agricultural product other than the main product; waste, scraps

_____ 3. Determining a product's quality by comparing it to industry standards

_____ 4. Removing the hide from an animal carcass

_____ 5. The straining process of cleaning unprocessed milk

_____ 6. The mixing process that prevents cream from separating from the milk

_____ 7. The process of heating milk to remove harmful bacteria

_____ 8. Packaging designed to prevent access to the product before it is purchased

_____ 9. The packaging used by the processor, wholesaler, or retailer

a. butchering
b. by-products
c. clarification
d. dressing
e. grading
f. homogenization
g. pasteurization
h. primary packaging
i. processing
j. sealed packaging
k. secondary packaging
l. sorting
m. sterilization
n. tamper-resistant packaging
o. waste

May be photocopied for student use.

OBJECTIVE 2

Distinguish among the stages of production. Write a "1" in the blank before phrases related to pre-processing; a "2" in the blank before phrases related to processing; and a "3" in the blank before phrases related to post-processing.

_____ 1. Stacking 2X4's in a lumber yard

_____ 2. Fish being made into fish sticks

_____ 3. A sawmill cutting trees into lumber

_____ 4. Fish in a fish farm tank

_____ 5. Stocking loaves of bread on a grocery store shelf

_____ 6. A field of wheat

_____ 7. Wheat being harvested

_____ 8. Shipping boxes of fish sticks to the grocery store in a refrigerated truck

_____ 9. A stand of trees

_____ 10. Corn being ground into meal

OBJECTIVE 3

List manufacturing processes associated with agricultural products. List two processes for each of the following.

Meat and poultry

____

____

____

____

Grains

____

____

____

____

May be photocopied for student use.

Fruits and vegetables

____

____

____

____

Dairy products

____

____

____

____

Fish

____

____

____

____

Non-food products such as forestry products and textiles

____

____

____

____

OBJECTIVE 4

Select from a list the purposes of packaging. Write an "X" in the blanks before correct answers.

_____ 1. Keeps moisture in or out

_____ 2. Improves the aroma of the product

_____ 3. Used for transportation and storage

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_____ 4. Protects the product from contamination

_____ 5. Fits easily in storage facilities

_____ 6. Provides easy access to the product before purchase

_____ 7. Makes the product easy to use

_____ 8. Improves the taste of the product

_____ 9. Is suitable for retail display and sales.

_____ 10. Keeps gasses in or out

_____ 11. Attracts the customer's eye to promote sales

OBJECTIVE 5

Select from a list true statements about the role of transportation. Write an "X" in the blanks before true statements.

_____ 1. Grain and other necessities were traded centuries ago, but delicacies were transported only recently.

_____ 2. The most common forms of transportation are trucking, railroads, and shipping.

_____ 3. The size and weight of secondary packaging is often designed with transportation in mind.

_____ 4. The most common form of transportation is truck farming.

_____ 5. Specially designed trucks and railroad cars protect the temperature and atmosphere in which products are shipped.

_____ 6. Secondary packaging is used by the consumer.

_____ 7. Airplanes ship most produce, since during shipment temperature and atmosphere cannot be controlled.

_____ 8. Delicacies like snails and seafood were transported centuries ago.

_____ 9. Ancient farmers could not specialize in cash crops.

May be photocopied for student use.

_____ 10. Retail prices may be affected by changes in trucking fees and fuel prices.

NOTE: Objectives 6-8 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

AGRICULTURAL PRODUCTS AND PROCESSING

IX

OBJECTIVE 1

1. h
2. b
3. e
4. d
5. c
6. f
7. g
8. n
9. k

OBJECTIVE 2

1. 3
2. 2
3. 2
4. 1
5. 3
6. 1
7. 2
8. 3
9. 1
10. 2

OBJECTIVE 3

Answers should include two processes from each category.

Meat and Poultry

- Slaughtering
- Grading
- Dressing
- Cutting
- Cooking and/or breading
- Forming into "designer meats" such as steak fingers or patties
- Canning
- Drying (jerky)
- Aging

Grains

- Harvesting
- Threshing
- Hulling
- Sieving
- Milling

Fruits and Vegetables

- Picking
- Grading
- Sorting
- Packaging of fresh items for protection
- Canning
- Juicing
- Drying
- Freezing

Dairy

- Clarification and straining
- Homogenization
- Pasteurization
- Fat removal (for skim and low-fat products)
- Fermenting (yogurt)
- Aging
- Drying

Fish

- Cleaning
- Cutting
- Freezing
- Smoking
- Canning
- Drying
- Forming into "designer" cuts such as fish sticks

Forestry and Textiles

- Harvesting
- Cutting
- Forming into products such as paper, turpentine, etc.
- Replanting
- Picking
- Cleaning
- Spinning
- Dying
- Weaving

OBJECTIVE 4 1, 3, 4, 7, 9, 10, 11

OBJECTIVE 5 2, 3, 5, 8, 10

642

OBJECTIVE SHEET

AGRICULTURAL POWER

X

INTRODUCTION

How would you like to plant, cultivate, and harvest an acre of wheat with nothing but your own two hands and a few hand-held tools? What about 10 acres? Or a hundred? You say you wouldn't like that? Then you understand how important power and mechanization are to agriculture.

From harnessing animals to harnessing the wind and sun, agriculture has used many power sources. Today, we rely on the internal combustion engine. New technologies will utilize new fuels, robotics, and other innovations to make farming even more profitable.

UNIT OBJECTIVE

After completing this unit, the student will be able to recognize basic safety rules, maintenance procedures, engine functions, fuels, technologies, and power equipment. The student will be able to perform basic automotive and small engine maintenance procedures. The student will demonstrate these abilities by completing job sheets, practical tests, and a written test with a minimum of 85% accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with agricultural power to their definitions.
2. Choose the word or phrase that completes statements about following safety rules.
3. Choose the word or phrase that completes statements about basic engine functions.
4. List basic equipment maintenance procedures.
5. Select from a list types of fuels used in agriculture.
6. Discuss new technologies.
7. Label basic power equipment for agriculture.
8. Perform basic maintenance on a vehicle. (Job Sheet 1)
9. Perform basic engine service on a lawn mower. (Job Sheet 2)

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Appropriate guest speakers include: farming implement salespeople, antique tractor collectors, automotive and/or small engine repair specialists, and your local county extension agent.

  NOTE: Supply speakers with specific objectives and other appropriate sections of the unit.

- Arrange to have all materials and supplies necessary to complete activity sheets and job sheets.

- Acquire catalogs and magazines illustrating the variety of machines available.

- Acquire photographs or other illustrations of machinery used in your area.

DELIVERY

Objective 1: Match terms associated with agricultural power to their definitions.

- Add to the list the names of implements and vehicles used most frequently in your area.

- Add to the list any terms presented to students in your discussions or by guest speakers.

- Have students define terms such as "power" or "fuel." They will be familiar with the terms and understand them, but may have difficulty defining them.

- Have students list as many terms as they can think of in each of these categories:

  — Parts of automobiles
  — Machines used in agriculture
  — Parts added to or replaced in vehicles
  — Machines with internal combustion engines

Objective 2: Choose the word or phrase that completes statements about following safety rules.

- Review the safety rules you will expect students to follow.

- Show safety videos.

  NOTE: See Suggested Resources.

- Use Student Supplement 1 to provide interested students with information about the tractor safety course.

- Review and demonstrate proper use of a fire extinguisher. Use Transparency Master 1 to explain the proper use of a fire extinguisher.

- Invite a high school auto shop instructor to discuss safety practices.

- Allow students to visit an auto repair shop or vocational/technical school auto repair classroom and observe safety rules in practice.

Objective 3: Choose the word or phrase that completes statements abcut basic engine functions.

- Discuss details about engine functions in addition to the information provided in the unit.

- Invite a mechanic to discuss different types of engines, such as the rotary or diesel engine.

- Display spark plugs, pistons, and other parts. Describe their function and importance.

- Discuss the maintenance associated with each engine part and its importance.

Objective 4: List basic equipment maintenance procedures.

- Display a variety of types of belts, filters, etc.
- Use Activity Sheets 1 and 2 to have students complete related procedures.
- Use Job Sheets 1 and 2 to have students complete basic maintenance procedures.

Objective 5: Select from a list types of fuels used in agriculture.

- Have students collect newspaper and magazine articles about uses of new and/or alternate fuels.
- Have students write the Department of Transportation or energy companies for more information about research into different fuels.
- Invite an environmentalist to discuss the need for alternative fuels.
- Use Student Supplement 2 to illustrate how fuel costs affect the price of agricultural products.

Objective 6: Discuss new technologies.

- Present as many examples of new technology as possible. Use equipment catalogs, brochures, and magazines for sources.
- Invite an equipment salesperson to discuss changes in technology.
- Invite an antique tractor collector to discuss how past technologies have affected machinery.
- Have students predict what tractors will look like in 50, 100, and 200 years.
- Have students construct a model of the tractor of tomorrow.
- Have students design a tractor for underwater or outer space farming.
- Use Student Supplement 3 to illustrate the evolution of power equipment.
- Use Student Supplement 4 to illustrate the various uses of agricultural equipment.

Objective 7: Label basic power equipment for agriculture.

- Take the class to an implement dealer and have them identify the various types of equipment.
- Have students identify implements in magazines and catalogs.
- Take students to a farm and allow them to see how the soil is affected by using different implements.
- Add to this list equipment frequently used in your area.

APPLICATION

Objective 8: Perform basic maintenance on a vehicle.

- Invite a mechanic to explain and demonstrate the procedures listed.
- Review and stress safety rules throughout the procedures.

Objective 9: Perform basic engine service on a lawn mower.

- Explain the similarity between components on a small engine and a large engine.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.
- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- Oklahoma Department of Vocational and Technical Education, Resource Center, ATTN: Instructional Media Specialist, 1500 West Seventh Avenue, Stillwater, OK 74074. The following videos are available to Oklahoma teachers on a free loan basis.

  John Deere Safety Programs. Covers a variety of safety situations. (80 minutes, VHS)

  Shop Talk — Engine Filtration & Lubrication. FRAM. Lesson 1, "Air Filtration" discusses how the air filter works, what it traps, and why air filtration is important. Lesson 2, "Oil Filtration" discusses how oil cools, cleans, and seals and the importance of filtration. Lesson 3, "Fuel Filtration," covers external fuel contaminants and demonstrates replacing the air, oil, and fuel filters. (30 minutes - each lesson runs 10 minutes, color, VHS)
- Oklahoma State University Cooperative Extension Service. Several videotapes are part of the Extension Service Videotape Library and are available for free loan through your county extension agent.

Print Media

- *Caterpillar—Great American Legend.* Motorbooks International: Osceola, Wisconsin, 1986.

- The Cooperative Extension Service and Agricultural Experiment Stations of Oklahoma State University offer a large selection of fact sheets available from Central Mailing Services, Oklahoma State University, Stillwater, OK, 74078-0550 or from your local county extension agent.
- Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications.* Delmar Publishing, Inc.: Albany, 1990.
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UNIT REFERENCES

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- *Introduction to Automotive Service.* Oklahoma Department of Vocational and Technical Education: Stillwater, OK, 1989.
- Kelley, Kenneth. Farmer, rancher, and antique tractor restorer, Perry, OK. Interview, October 1991.
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- *Tractors and Power Units.* AVI Publishing Co.: Westport, CT, 1984.
- Witney, Brian. *Choosing and Using Farm Machines.* Longman Scientific and Technical: Essex, England, 1988.

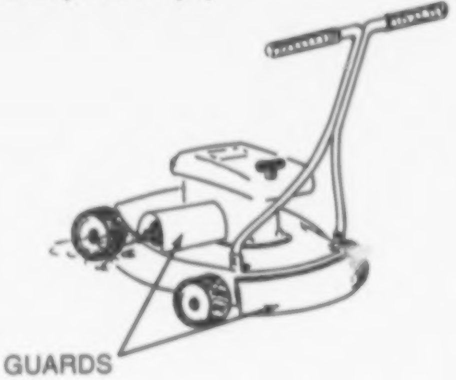
OBJECTIVE 1

Match terms associated with agricultural power to their definitions.

- **fossil fuels** – fuels derived from the remains of ancient plants and animals

  EXAMPLES: gasoline, oil, natural gas

- **guards** – protective covers or shells added by the manufacturer to prevent injury



- **implement** – a device used for a specific activity; a tool
- **internal combustion engine** – an engine that is powered by controlled explosions
- **lubricant** – a substance that helps moving parts move freely by reducing friction

  NOTE: Lubricants protect parts from wear and heat. Engine parts must function at very high temperatures. Without proper lubrication, engine parts can be damaged.

- **maintenance** – service regularly performed on a machine or engine

  EXAMPLES: Changing oil and filters, replacing brake pads, cleaning air filters, sharpening blades

- **solar power** – power supplied by the sun's rays and radiation
- **spark plug** – an engine part that produces a small spark to ignite fuel

OBJECTIVE 2

Choose the word or phrase that completes statements about following safety rules.

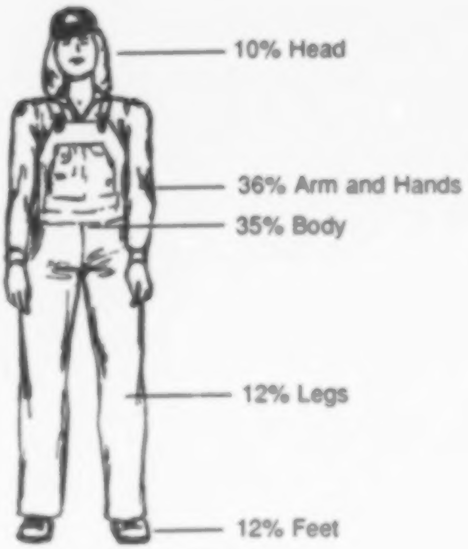
Farm safety has become an important issue recently. The nature of farm work, the use of heavy machines, and the exposure of children to farm chores lead to many accidents, from smashed thumbs to serious and fatal injuries.

When machinery is used, special care must be taken. Moving parts and combustible fuels can be dangerous. As you work on this unit, follow these rules and any other safety guidelines your instructor gives you. How well you have followed safety rules will be a part of every grade in this unit.

- Use tools and equipment for their intended purposes only.
- Return all tools to their proper places after use.
- Report any defective or broken parts, tools, machines, or other equipment to your instructor.
- Keep guards or safety devices in place.
- Disconnect the power source before working on equipment.

  EXAMPLES: Unplug electrical items, disconnect batteries
- Perform maintenance procedures only after receiving proper instructions.
- Use the right tool for the job.

Just as no place is totally safe, no part of your body is safe from injury. Machinery related accidents injure thousands each year. The types of injuries are illustrated below:



- Report all accidents to your instructor.
- Wear protective equipment such as safety glasses, ear plugs, and gloves.

  NOTE: Do not wear gloves when working with moving parts.
- Secure loose clothing and long hair when working around machinery or rotating equipment.
- Remove rings and other jewelry when working on machinery.
- Lift heavy objects with your legs, not your back.
- Wipe up all spills immediately.
- Store oily rags, combustible materials, and solvents properly.

  NOTE: Fuels, lubricants, and many chemical mixtures are flammable and can be explosive. They must be stored in proper containers and in a safe place.
- Do not block doors or traffic paths.

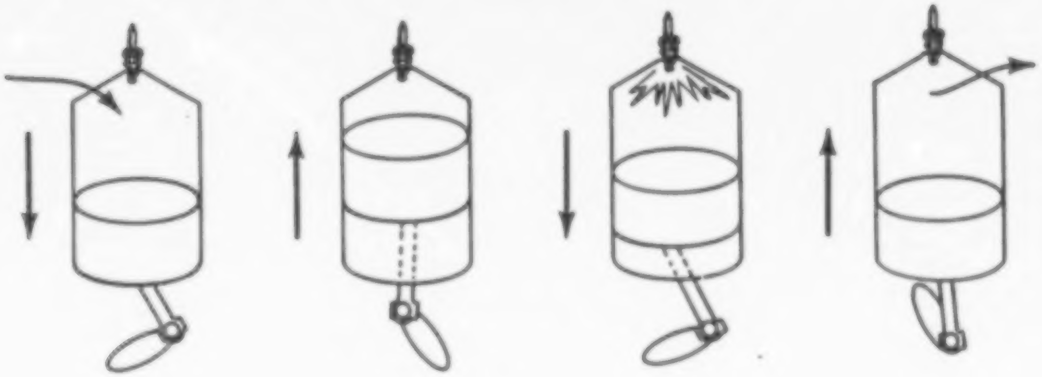
- Be sure a fire extinguisher is available before performing maintenance procedures.

OBJECTIVE 3

Choose the word or phrase that completes statements about basic engine functions.

Like automobiles, most agricultural machinery uses an internal combustion engine. This engine uses controlled explosions to create energy, then transforms the energy to mechanical power.

The engine needs oxygen and fuel to operate. A small amount of fuel is channeled into the cylinder. The spark plug is activated, a spark is produced, and the fuel is ignited.



The force of the explosion moves the piston down. The movement of the piston turns the crankshaft. A series of gears, pulleys, and belts transfers the crankshaft movement to other parts and assemblies that rotate the tires, recharge the battery, and complete other functions.

OBJECTIVE 4

List basic equipment maintenance procedures.

In any engine, maintenance is necessary to keep it in proper working order, prolong the useful life of the engine, and protect the person using it. Most maintenance is simple, and maintenance instructions and schedules are always included in the owner's manual.

Basic maintenance includes the following:

- Replacing lubricants and filters regularly
- Using proper fuels
- Maintaining proper inflation in all tires and replacing worn tires

- Keeping water, anti-freeze, and other fluids at their proper levels
- Replacing worn belts, spark plugs, hoses, and other parts

OBJECTIVE 5 **Select from a list types of fuels used in agriculture.**

- Fossil fuels
  - Gasoline

    EXAMPLE: Used in cars, chain saws
  - Diesel

    EXAMPLE: Used in tractors, trucks
  - Natural gas

    EXAMPLE: Used in irrigation equipment, engine fuel
  - Propane

    EXAMPLE: Used in heating homes, greenhouses

For years, natural gas was burned off at oil refineries and processing plants. It was considered worthless. Today we know better. Natural gas is readily available and less polluting than other fossil fuels.

Many experts believe Americans should begin using natural gas to fuel their cars and Oklahoma's government agrees. Special tax credits were passed in 1991 that will encourage people to equip their cars to run on compressed natural gas. Many large fleets, such as school district bus systems, have made the switch. However, many consumers want to wait until natural gas is more easily available at their local service stations. Service station managers will not carry the natural gas until there is a good customer demand for it.

Nevertheless, experts agree that traditional fossil fuels will have to be used less in coming years and believe that natural gas will be used more.

- Ethanol and methanol

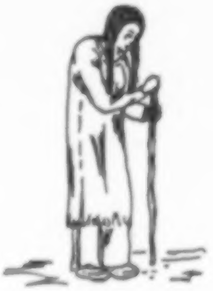
  NOTE: Ethanol is usually distilled from corn; methanol can be produced from organic wastes.

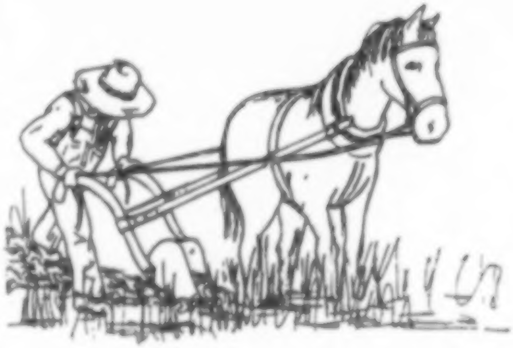
- Hydrogen

> Modern technology has made hydrogen safe, and it is considered a fuel of the future, especially in Germany, where some auto makers have begun featuring hydrogen-powered cars.

OBJECTIVE 6 **Discuss new technologies.**

There are few technologies as old as agricultural power. In the past man has used his own muscle, the power of horses, elephants, oxen, steam, water, wind, and fossil fuels to increase productivity.





As in the past, technological advances will make it easier to raise more and higher quantity agricultural products. They will also protect the environment and conserve fuels. Al Higley, Division Manager of Public Relations at Deere and Company, explains that diesel-powered agricultural machines have been used for many years and will continue to be used for many years to come. Changes to the machines will be the result of consumer needs and demands. "Changes will be evolutionary, not revolutionary," he believes. He points to increased fuel and chemical application monitoring, improved fuel efficiency, and the addition of wiring for cellular telephones as changes consumers have asked for. However, some new technologies, such as using lasers to harvest crops, are possible but not likely because they increase costs without meeting consumer demands. Many of these same technologies, however, are used to produce the machines at lower cost.

In the future, you will see some of the following new technologies:

- Robots will perform more work that was previously done by people. Accuracy is assured and people do not have to be exposed to chemicals, temperatures, or other dangers or discomforts. Robotics will be used extensively in food processing.

- Computers will monitor tedious and dangerous tasks. Already, many tractors include computers as part of their standard equipment. These computers can monitor fuel usage, area coverage, and the amount of chemicals distributed. These computers will allow the farmer to work at the most profitable level and protect the environment at the same time.

- A new market for aerators and seed drills that don't disturb the soil cover has developed. Changes in soil maintenance have also affected agricultural power. For example, as more farmers use no-till methods, fewer cultivators are being sold.

- More safety and comfort designs will continue to appear. For example, telephones can now be installed in tractors and chemicals can be loaded into new model sprayers so the farmer doesn't breathe or come into contact with the chemical.

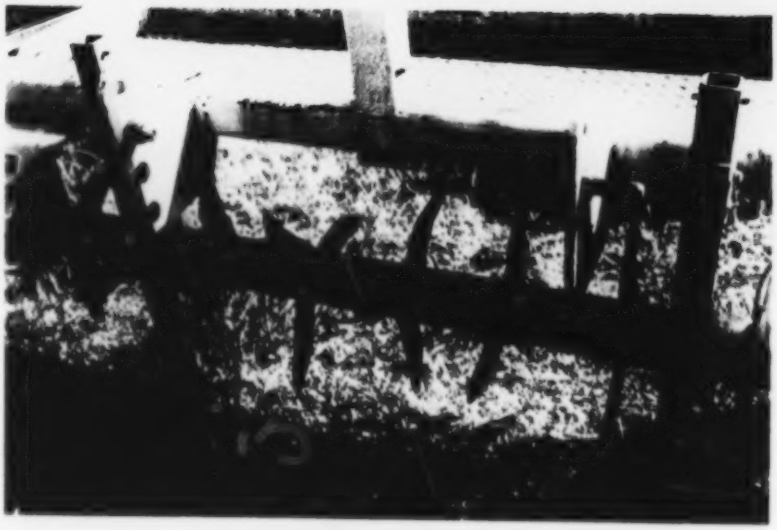
- Computers will more carefully monitor fuel usage and alternate fuels will be used increasingly.

OBJECTIVE 7 **Label basic power equipment for agriculture.**

There are several basic pieces of power equipment. They include:

- **aerators** -- make holes in the soil to allow oxygen to enter and circulate through the soil

AERATOR



- **balers** – shape harvested hay into bales

NOTE: There are three basic types of balers. One produces large, square bales; one produces small, square bales; and the other produces large, round bales. New balers wrap the bales in nylon sheeting rather than wrapping them with string or wire.

SMALL SQUARE BALER

Photo courtesy of Deere and Company, Moline, Illinois.

ROUND BALER

Photo courtesy of Deere and Company, Moline, Illinois.

LARGE SQUARE BALER

Photo courtesy of Hesston.

- **carriers** – carry equipment, bales, etc. and can be truck beds or special trailers
- **combines** – complete a variety of tasks, including harvesting, threshing, separating, and carrying the harvested product to a truck or storage bin

COMBINE

Photo courtesy of Deere and Company, Moline, Illinois.

- **cultivators** – break up the soil and destroy weeds between crop rows

  NOTE: Row cultivators break soil between rows; field cultivators can break up a large area in a single pass.

FIELD CULTIVATOR

Photo courtesy of Deere and Company, Moline, Illinois.

- **disks** – till the ground and break up the ground cover

DISK AND HARROW

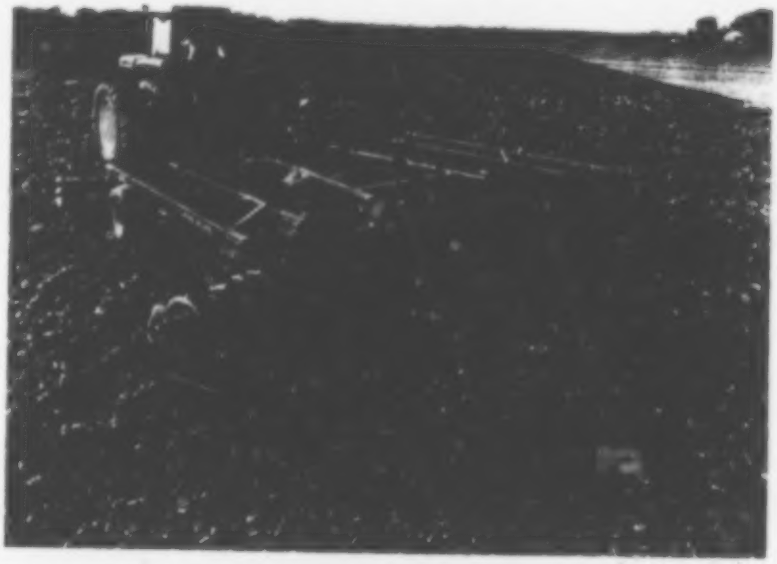


Photo courtesy of Deere and Company, Moline, Illinois.

- **drills** – drill holes in the soil and deposit seeds

DRILL

Photo courtesy of Deere and Company, Moline, Illinois.

- **harrows** – break topsoil crusts, mix treatments into the soil, and aerate the soil

DISK, SPRINGTOOTH, AND HARROW

Photo courtesy of Deere and Company, Moline, Illinois.

- **disk mowers, windrows, sicklebars, and swathers** – cut forage crops such as alfalfa and hay

SWATHER

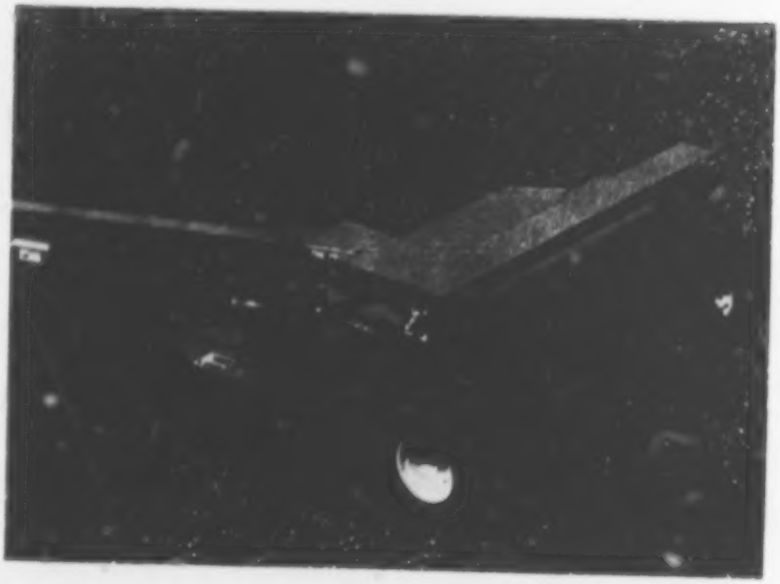


Photo courtesy of Deere and Company, Moline, Illinois.

- **plows** – turn over the soil and prepare it for seeding

PLOW

Photo courtesy of Deere and Company, Moline, Illinois.

- **tractors** – pull or push a variety of implements; tractors come in a wide variety of sizes and horsepower

TRACTOR

Photo courtesy of Deere and Company, Moline, Illinois

TRACTOR-DRIVING SCHOOL

Many Oklahoma teenagers find summer employment in the fields. But beware! The farm can be a dangerous workplace. If you don't really know what you are doing and how the equipment around you works, you can quickly be injured or killed.

Because of the high number of farm-related accidents, Oklahoma law requires the completion of a certified tractor safety course for all 14-15 year olds who are paid to do work that involves driving a tractor.

Passing the course does not mean you are able to operate a tractor, it only means you have been instructed in safe practices.

For more information about the next course in your area, contact your instructor.

RELATIONSHIP BETWEEN AGRICULTURAL AND FUEL ECONOMIES

Agriculture and energy go hand in hand. For a farmer to be able to grow a product and transport it to market, fuel must be available. If fuel costs go up, the farmer must earn enough from the product to cover the increased fuel cost. This, in turn, increases the cost of food to the consumer. These changes affect our economy by determining prices, interest rates, inflation rates, and many other things.

In 1986, the average Oklahoma farmer spent $1,793 on fuel and oil. By 1990, that cost had risen to $2,077. In 1989 farmers spent $7.42 billion dollars on fuel and electricity– approximately the same amount spent for all cotton and tobacco produced in the U.S.

ANTIQUE AGRICULTURAL IMPLEMENTS

You might dream of owning your own car someday, but Kenneth Kelley dreamed of owning his own train – and now he does. The Perry, Oklahoma resident remembers watching the big steam locomotives and steam engines when he was a child and thinking about what huge, wonderful machines they were. He still enjoys talking about them. "The monster of the Plains, that's what they called them. They are what broke the sod and powered the country, the whole nation really. The steam engines produced electricity and everything. There's nothing built today that can beat a steam engine. It kind of makes you wonder how man could have brains enough to make that."

Mr. Kelley spends his spare time restoring the old engines and bringing them back to life. His collection includes, not only the steam locomotive, but a circus wagon, four restored antique cars, and "a whole bunch of tractors." He has restored all the tractors himself and has one of every model CASE steam engine, " . . . even the biggest one. It's almost as big as the locomotive."

What makes a person want to collect tractors and steam engines? Mr. Kelley explains that he grew up on a farm around steam engines. He also likes to work on machines, and just likes the big, old engines. "Restoring one takes about a year. It's no small deal."

As for today's machinery, he thinks it will be important to collectors someday, too. "In 50, 75, maybe 100 years from today they'll be good collecting because diesel will go out someday. We'll be using atomic power or something. Machines won't have so many parts. But someday diesel will go."

MOTOR EQUIPMENT AND THE ASWAN DAM

Agriculture relies on machines and motor equipment. Tractors, trucks, backhoes, and other vehicles make modern farming possible. But there are other uses for these same vehicles. One example occurred in the 1960's in Egypt.

In 1960, the Egyptian government started building the Aswan Dam across the Nile. This dam would trap water, making it available for irrigation and could help control annual floods. It took more than ten years to complete the dam. The project more than tripled the amount of land that could be farmed in Egypt.

Unfortunately, the resulting lake, Lake Nasser, would be 300 miles long and cover what were once considered holy lands. The homeland of the Nubian people would be flooded and many ancient treasures would be lost.

But, with the help of the United Nations and motor equipment such as cranes, tractors, dozers, trucks, and trailers, 19 great treasures were saved. These treasures were removed from their original sites and transported to higher ground during the construction. In the last phases of moving the treasures, men and equipment worked in shallow water, trying to get everything out before the final flooding.

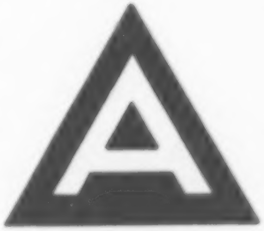
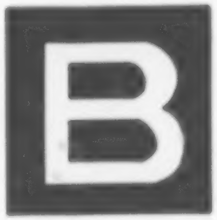
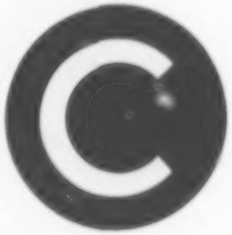
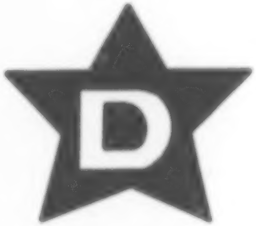
The largest of the structures was the Temple at Abu Simbel. It is the tomb of Ramses and his wife. Ramses believed he was a god, and his people agreed. Therefore, his tomb was especially grand. The front is guarded by small statues of soldiers and animals. Behind them, four great kings sit in thrones more than 300 feet high. Behind them, a series of rooms held Ramses' treasures. One inner room receives daylight only twice a year. At those times, the statue of Ramses, the sun god, and the god of Thebes are illuminated, but the statue of the god of the underworld "dwells forever in gloom."

To save the temple, the entire structure was cut into pieces, carried to higher ground, and reconstructed. No piece is more than 1/10 of an inch out of its original place. The sun still illuminates the same rooms on the same days. Even the hill and caves behind the great temple were reconstructed.

And the use of agricultural machines didn't stop there. New farmlands were leveled and given to the Nubians. Within a few months of filling the lake, the Nubians were raising a new crop, cotton. Since that time, cotton production has grown to Egypt's second-largest export, exceeded only by oil.

TRANSPARENCY MASTER 1 - 8th Grade Agriculture
CIMC - X - 31

Standard Letter Symbols for Fire Extinguishers

GREEN	RED	BLUE	YELLOW
			
ORDINARY COMBUSTIBLES	FLAMMABLE LIQUIDS	ELECTRICAL EQUIPMENT	COMBUSTIBLE METALS

Distinctive letters, shapes, and colors mark extinguishers according to the classes of fires on which they should be used.

ACTIVITY SHEETS 1-2

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  – Following written instructions

  EMPLOYABILITY SKILLS

  – Mastering specific job task/procedure

- If students have difficulty following written instructions:

  – Discuss the importance of following instructions precisely.

  – Have students read the instructions several times, noting the key words.

- If students have difficulty mastering specific job task/procedure:

  – Emphasize the fact that practice makes a person proficient, and proficiency makes a person confident.

  – Suggest they study each component of the procedure to determine which area is causing difficulty.

  – Review the entire procedure.

  – Team them with proficient students or professionals to practice the procedure.

ACTIVITY SHEET 1 | ***AGRICULTURAL POWER*** | ***X***

CHANGING A TIRE

INTRODUCTION

Everyone should know how to change a tire. It is not difficult, but there are several things to keep in mind. Remember safety rules when changing a tire. Refer to the owner's manual and follow all the instructions found there.

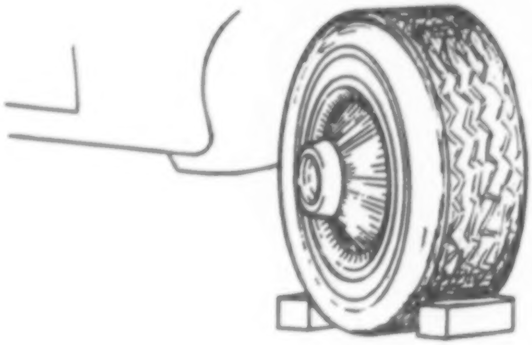
DIRECTIONS

Functional Reading Skills
- Follow written instructions

Job Acquisition/Development Skills
- Master specific job task/procedure

1. Set the parking brake.
2. Block the tire opposite the tire to be changed using a rock, brick, or log.

TIRE BLOCKED CORRECTLY



3. Remove the hub cap with a screwdriver or the flat end of a lug wrench.
4. Loosen—but do not remove—the lug nuts with a lug wrench.
5. Using the owner's manual, locate the proper lift points under the frame.
6. Place the jack under the lift point. If the ground is uneven or soft, place the jack on a board.
7. Using the owner's manual instructions, raise the vehicle with the jack. Only raise it high enough to remove and replace the wheel.
8. Remove the lug nuts.

9. Remove the wheel.

10. Put the new tire in place. Align the bolt holes in the new tire with the lugs and push firmly on the wheel.

11. Replace the lug nuts and tighten them by hand.

12. Using the owner's manual instructions, lower the vehicle with the jack.

13. Tighten the lug nuts firmly with a lugwrench.

14. Replace the hub cap.

JUMP START AN ENGINE WITH BATTERY CABLES

INTRODUCTION

Jump-starting someone's car might make you a hero—if you do it right. If you do it wrong, however, the battery can explode, injuring you and anyone standing nearby, as well as damaging the car. Jump-starting involves sending electrical current from one battery to another. Safety must be kept in mind at all times.

CAUTION: Do not jump-start an engine if you are not familiar with the vehicle or if these instructions do not apply.

DIRECTIONS

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure

1. Wear safety goggles and gloves.
2. Be sure your jumper cables are 4-gauge or larger, are not made of aluminum wiring, and are less than 15 feet long.
3. Raise the hoods of both vehicles.
4. Connect one jumper cable clamp to the positive terminal of the booster battery, that is, the "good" battery. The positive terminal is red and will have "P" or "+" on the battery case.

CAUTION: Be sure unconnected clamps do not touch each other or anything metal.

NOTE: Cable clamps are usually red and black. Connect the red clamps to the positive (red) terminals and the black clamps to the negative (black) terminals.

5. Connect the clamp at the other end of the same cable to the positive terminal of the other battery.
6. Connect another clamp to the negative terminal of the good battery. It will be black and an "N" or "–" will be on the battery case near it.
7. Connect the last clamp to a metal ground such as the automobile frame or a bracket.

CAUTION: DO NOT attach cable clamps to any part of the fuel system.

8. Have your instructor start the car with the "bad" battery.
9. Disconnect the last clamp connected (to a ground).
10. Disconnect the clamp from the "good" battery's negative terminal.
11. Disconnect the clamp from the "bad" battery's positive terminal.
12. Disconnect the clamp from the "good" battery's positive terminal.
13. Close the hoods of both cars.

JOB SHEETS 1-2

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  MATHEMATICS SKILLS

  - Making measurements

  SCIENCE SKILLS

  - Using scientific instruments (pressure gauge)

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Practicing good work habits/attitudes

- If students have difficulty making measurements:

  - Review the units of measure in the English and metric systems.
  - Determine which measurement system is used on the available equipment and demonstrate its use.

- If students have difficulty using scientific instruments (pressure gauge), demonstrate the proper use of the instrument.

- For additional suggestions on teaching basic skills refer to Instructional Supplement 1.

JOB SHEET 1

AGRICULTURAL POWER

X

OBJECTIVE 8

Perform basic maintenance on a vehicle.

INTRODUCTION

Performing basic maintenance on a vehicle ensures a longer engine life and prevents expensive repairs and breakdowns. You should become familiar with the maintenance procedures for vehicles you operate and perform them routinely.

EQUIPMENT AND SUPPLIES

- Vehicle
- Owner's manual
- Rags
- Screwdriver
- Oil
- Water or coolant
- Brake fluid
- Air pressure gauge

PROCEDURE

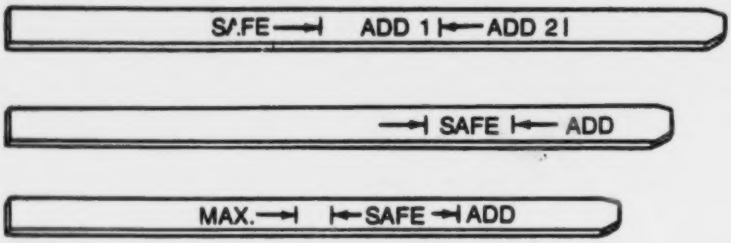
Functional Reading Skills

- Follow written instructions

Check oil level

1. Make sure the car is parked on level ground.
2. Make sure the car has not been running for 10 minutes or more.
3. Locate the oil dipstick. If you don't know where it is, consult the owner's manual.
4. Remove the dipstick and use a rag to wipe it clean.
5. Reinsert the dipstick. Be sure you insert it as far as it will go.
6. Remove the dipstick again.
7. Look at the dipstick. The oil level should register in the "safe" area.

THREE TYPICAL DIPSTICKS



8. If oil is in the "safe" area, do not add oil. If oil is in the "add" area, add oil using the owner's manual instructions.

PROCEDURE

Functional Math Skills
- Make measurements

Check coolant level

1. Make sure the car has cooled thoroughly.
2. Read the owner's manual instructions for checking coolant level.
   a. If the radiator cap has to be removed, make sure the radiator is cool. Slowly remove the cap.

⚠ **CAUTION:** Never remove the cap if the car is warm or running. Burns may result.

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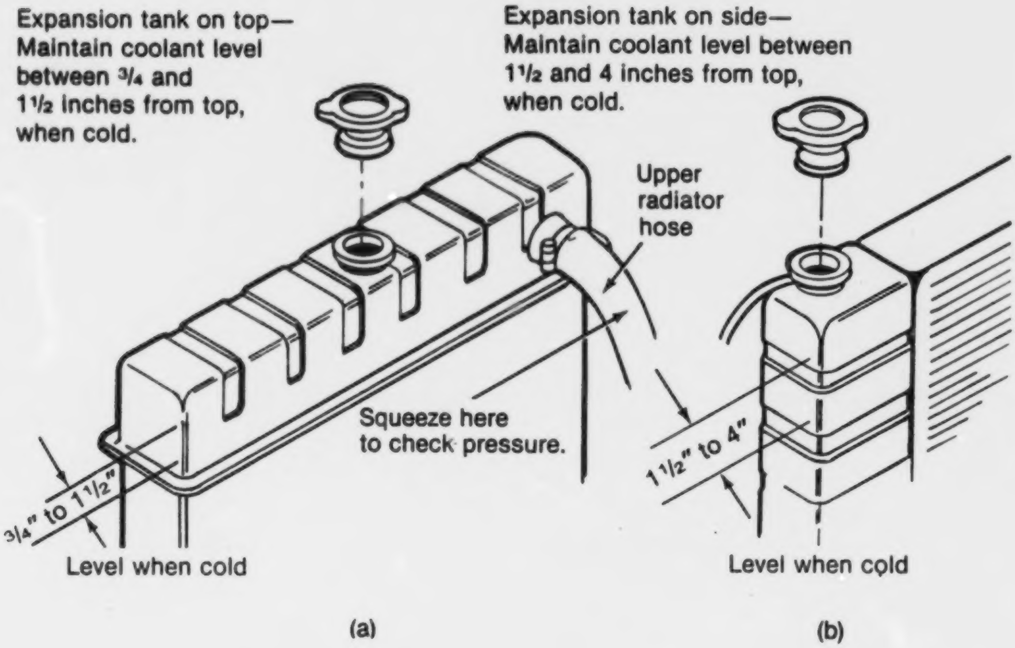
   b. The fluid level should be between ¾ and 1½ inches from the top on some models and between 1½ and 4 inches from the top on others. Consult the owner's manual to determine the correct level.

CHECKING COOLANT LEVELS

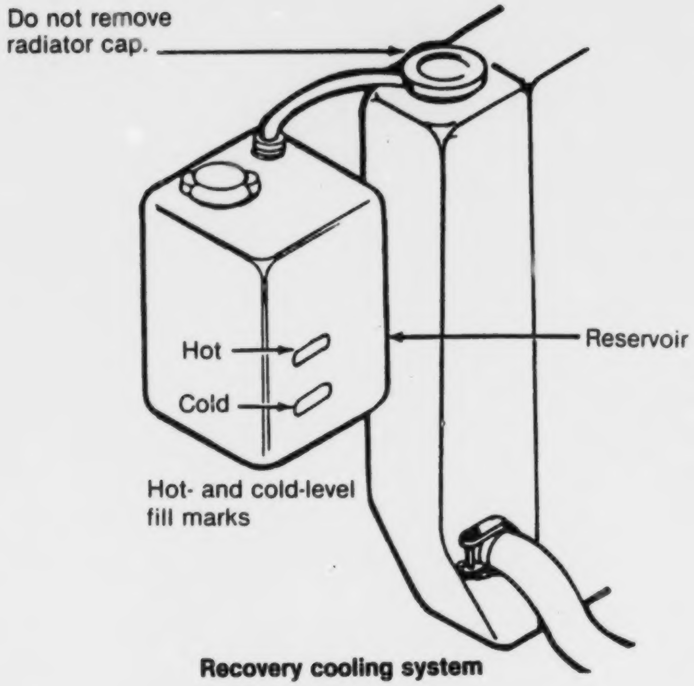

Expansion tank on top—
Maintain coolant level
between 3/4 and
1 1/2 inches from top,
when cold.
Expansion tank on side—
Maintain coolant level between
1 1/2 and 4 inches from top,
when cold.
Upper
radiator
hose
Squeeze here
to check pressure.
3/4" to 1 1/2"
1 1/2" to 4"
Level when cold
Level when cold
(a)
(b)

From *Introduction to Automotive Mechanics, Unit 2: Lubrication, Cooling, and Safety Inspection Services*, copyright ©1982, by State of Florida, Department of State. Used with permission of State of Florida, Department of Education.

c. If the radiator cap does not have to be removed, look at the side of the reservoir. The fluid should be at the appropriate level.

3. Add coolant as necessary, following owner's manual instructions.

RECOVERY COOLING SYSTEM


Do not remove radiator cap.
Reservoir
Hot
Cold
Hot- and cold-level fill marks

Recovery cooling system

From *Introduction to Automotive Mechanics, Unit 2: Lubrication, Cooling, and Safety Inspection Services*, copyright ©1982, by State of Florida, Department of State. Used with permission of State of Florida, Department of Education.

PROCEDURE

Check brake fluid level.

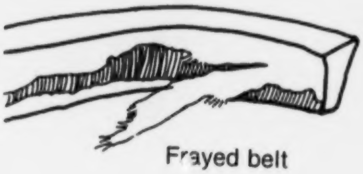
1. Locate brake fluid instructions in the owner's manual.
2. Follow instructions to check brake fluid levels.
3. If the level is low, add fluid following owner's manual instructions.

PROCEDURE

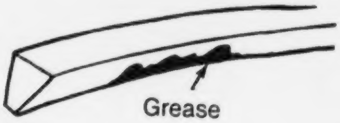
Check belts

1. Look at the belts. Look for grease, frays, and cracks.

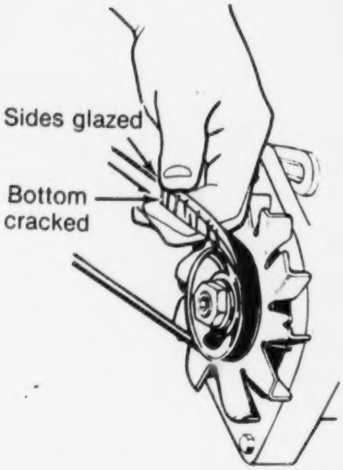
INSPECTING BELTS



Frayed belt



Grease



2. Look at the pulleys. The belts should ride on the sides of the pulleys, not the bottom of the pulley groove. If any of these signs of wear are visible the belt should be replaced.

3. Push down on the belt. If it can be moved more than ½ inch, it should be tightened.

NOTE: Tightening and replacing belts are not covered in this Job Sheet.

PROCEDURE

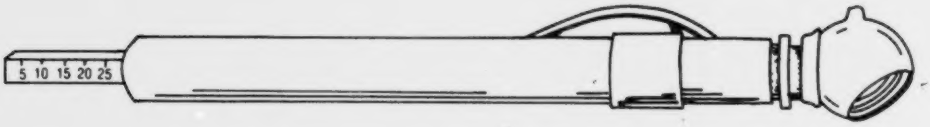
General Science Skills
- Use scientific instruments (pressure gauge)

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

Check air pressure

1. Check the owner's manual or look on the tire to find the recommended air pressure.
2. Make sure the car has not been driven for at least three hours.
3. Remove the valve-stem cap from the tire's valve stem.
4. Press the pressure gauge chuck onto the tire's valve stem.
5. Read the air pressure gauge.

AIR PRESSURE GAUGE



6. If the tire needs air, press the air-hose chuck onto the tire's valve stem. Stop frequently and check the air pressure until the correct pressure is obtained.
7. Have your instructor check your work.
8. Put away tools and clean work area.

OBJECTIVE 9

Perform basic engine service on a lawn mower.

EQUIPMENT AND SUPPLIES

- Lawn mower
- Owner's manual
- Oil
- Rags
- Spark plug gapper
- File
- Knife
- Pliers
- Water
- Compressed air
- Replacement muffler
- Screwdriver
- Spark plug wrench

INTRODUCTION

Each year thousands of people are seriously injured by lawnmowers. As you work on a lawnmower, remember that the blade turns at about 3600 revolutions per minute—that's 60 revolutions per second.

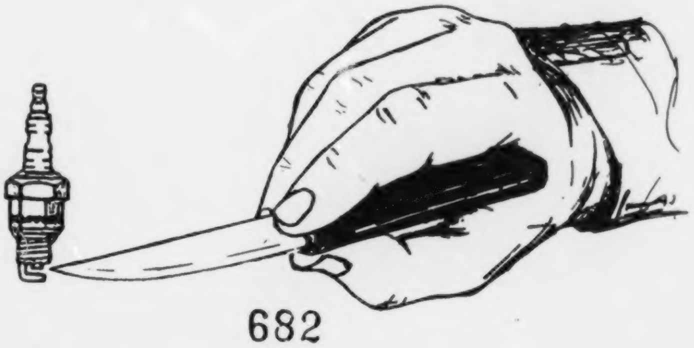
In 1982, legislation was passed that required a safety brake on all new lawnmowers. The safety brake must stop the blade in four seconds or less. Four seconds is not much time, but the blade will still have revolved 240 times before stopping.

PROCEDURE

Functional Reading Skills
- Follow written instructions

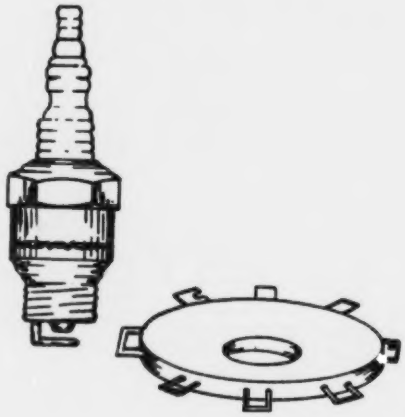
1. Remove the spark plug.
2. Use a knife to scrape any build-up from the spark plug.

SCRAPING THE SPARK PLUG



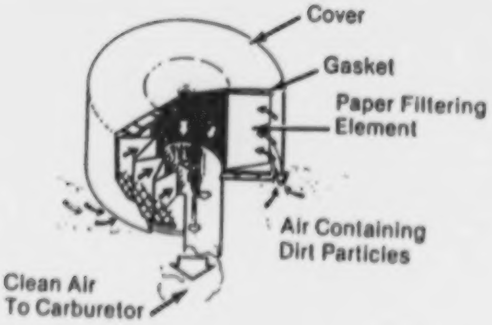
3. File the spark plug to remove any remaining corrosion.
4. Spray the spark plug with compressed air to clear away filings and dirt.
5. Gap the spark plug by bending the metal arm until it is the proper distance from the spark plug body. Check the gap using the spark plug gapping tool. Use the gap indicated in the owner's manual.

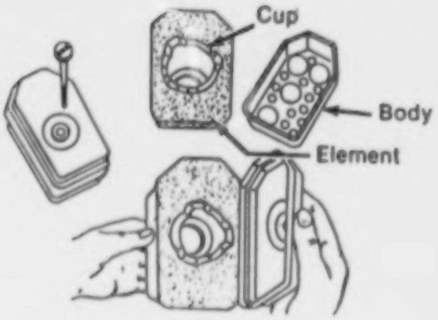
CHECKING THE GAP



6. Clean the air filter.
   a. Remove the air filter by unscrewing the top and opening the filter housing.

AIR FILTERS


Cover
Gasket
Paper Filtering Element
Air Containing Dirt Particles
Clean Air To Carburetor


Cup
Body
Element

Used with permission of Mid-America Vocational Curriculum Consortium

b. If the filter is the sponge type, remove the sponge carefully. Wash the sponge in solvent or soap and water, squeeze out the excess, and dry the sponge by squeezing it in a rag. Fill the sponge with clean oil, squeeze out the excess. Wipe out housing and replace filter.

c. If the filter is the dry element type, remove the filter from the casing and tap the bottom of the filter on the ground several times, and replace it.

7. Replace the muffler.

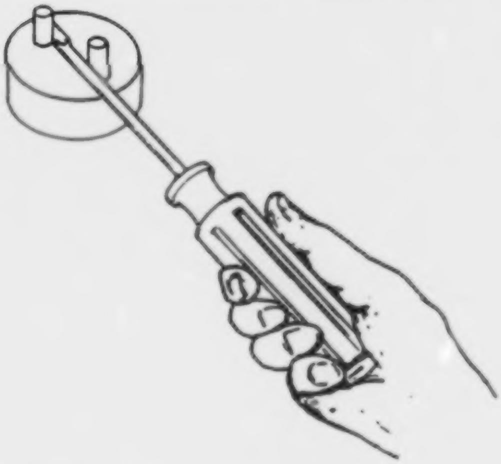
   a. Unscrew the existing muffler.

   b. Screw in the appropriate replacement muffler.

8. Check the oil.

   a. Open the oil chamber by placing a screwdriver between the two posts and turning it.

OPENING OIL CHAMBER



b. Lift the oil lid and wipe off the attached dip stick. Reinsert the dip stick, remove it again. Read the dipstick.

IMPORTANT: One of the most common mistakes is adding too much oil to a small engine. Most small engines will only hold ½ quart. Adding too much oil will force oil into the carburetor and make repair necessary.

9. Replace the spark plug.

10. Have your instructor check your work.

11. Return tools to their proper place and clean the work area.

Functional Math Skills
- Make measurements

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

JOB SHEET 1

Perform basic maintenance on a vehicle.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Made sure the car was parked on level ground	___	___
2. Made sure the car had not been running for 10 minutes or more	___	___
3. Located the oil dipstick	___	___
4. Removed the dipstick and used a rag to wipe it clean	___	___
5. Reinserted the dipstick as far as it would go	___	___
6. Removed the dipstick again	___	___
7. Read the dipstick	___	___
8. Added oil if necessary, following owner's manual instructions	___	___
Checked coolant level		
1. Made sure the car had cooled thoroughly	___	___

2. Read the owner's manual instructions for checking coolant level ___ ___
   a. If the radiator cap had to be removed, made sure the radiator was cool and slowly removed the cap ___ ___
   b. If the radiator cap did not have to be removed, looked at the side of the reservoir and read the fluid level ___ ___
3. Added coolant as necessary, following owner's manual instructions ___ ___

Checked brake fluid level

1. Located brake fluid instructions in the owner's manual ___ ___
2. Followed instructions to check brake fluid levels ___ ___
3. If the level was low, added fluid following owner's manual instructions ___ ___

Checked belts

1. Inspected the belts for grease, frays, and cracks ___ ___
2. Checked that the belts rode on the sides of the pulleys, not the bottom of the pulley grooves ___ ___
3. Pushed down on the belt and checked deflection ___ ___

Checked air pressure

1. Checked the owner's manual to find the recommended air pressure ___ ___
2. Made sure the car had not been driven for at least three hours ___ ___
3. Removed the valve-stem cap from the tire's valve stem ___ ___

4. Pressed the pressure gauge chuck onto the tire's valve stem ___ ___

5. Read the air pressure gauge ___ ___

6. If the tire needed air, pressed the air-hose chuck onto the tire's valve stem, stopped frequently and checked the air pressure until the correct pressure was obtained ___ ___

Overall

1. Used proper tools correctly ___ ___

2. Performed steps in a timely manner ___ ___

3. Practiced safety rules throughout procedure ___ ___

4. Provided satisfactory responses to questions asked ___ ___

5. Put away tools and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Checked oil level	4	3	2	1

Checked coolant level	4	3	2	1
Checked brake fluid level	4	3	2	1
Checked belts	4	3	2	1
Checked air pressure	4	3	2	1
Put away tools and cleaned work area	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 2

Perform basic engine service on a lawn mower.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Removed the spark plug	___	___
2. Used a knife to scrape any build-up from the spark plug	___	___
3. Filed the spark plug to remove any remaining corrosion	___	___
4. Sprayed the spark plug with compressed air to clear away filings and dirt	___	___
5. Gapped the spark plug by bending the metal arm until it was the proper distance from the spark plug body	___	___
6. Used the gap indicated in the owner's manual	___	___
7. Cleaned the air filter	___	___
a. Removed the air filter by unscrewing the wing nut at the top of the filter and opening the filter housing	___	___

b. If the filter was the sponge type, removed the sponge carefully; washed the sponge in solvent or soap and water, squeezed out the excess, and dried the sponge by squeezing it in a rag; filled the sponge with clean oil and replaced it; wiped out housing ____ ____

c. If the filter was the dry element type, removed the filter from the casing and tapped the bottom of the filter on the ground several times and replaced it ____ ____

8. Replaced the muffler with appropriate replacement muffler ____ ____

9. Checked the oil ____ ____

   a. Opened the oil chamber by placing a screwdriver between the two posts and turning it ____ ____

   b. Lifted the oil lid and wiped off the attached dip stick; reinserted the dip stick, removed it again; read the dipstick ____ ____

10. Replaced the spark plug ____ ____

11. Used proper tools correctly ____ ____

12. Performed steps in a timely manner ____ ____

13. Practiced safety rules throughout the procedure ____ ____

14. Provided satisfactory responses to questions asked ____ ____

15. Put away tools and cleaned work area ____ ____

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Removed and cleaned spark plug	4	3	2	1
Gapped spark plug	4	3	2	1
Cleaned air filter	4	3	2	1
Replaced muffler	4	3	2	1
Checked the oil	4	3	2	1
Replaced spark plug	4	3	2	1
Put away tools and cleaned work area	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

AGRICULTURAL POWER

X

Name ________________________ Score __________

OBJECTIVE 1

Match terms associated with agricultural power to their definitions. Write the correct letter in each blank.

_____ 1. Fuels derived from the remains of ancient plants and animals

_____ 2. Service regularly performed on a machine or engine

_____ 3. Protective covers or shells added by the manufacturer to prevent injury

_____ 4. An engine that is powered by controlled explosions

_____ 5. Power supplied by the sun's rays and radiation

_____ 6. An engine part that produces a small spark to ignite fuel

_____ 7. A substance that helps moving parts move freely by reducing friction

_____ 8. A device used for a specific activity; a tool

a. diesel engine

b. fossil fuels

c. guards

d. implement

e. internal combustion engine

f. lubricant

g. maintenance

h. methane

i. piston

j. safety gates

k. service

l. solar power

m. spark plug

May be photocopied for student use.

OBJECTIVE 2

Choose the word or phrase that completes statements about following safety rules. Write the correct letter in each blank.

_____ 1. When Jim tries to unscrew a wingnut, the wingnut breaks. He should

a. use a pair of pliers to remove the rest of the wingnut
b. use a hammer to loosen the wingnut, then unscrew it
c. report any defective or broken parts to your instructor
d. force the rest of the wingnut off with a screwdriver or chisel

_____ 2. When you are repairing equipment, you should wear
a. safety glasses and loose clothing
b. ear plugs, gloves, and loose clothing
c. safety glasses, loose clothes, and ear plugs
d. safety glasses, ear plugs, and gloves

_____ 3. Before performing any maintenance procedures, be sure

a. a fire extinguisher is available
b. all the windows are open
c. all the fuel is drained
d. the spark plug is connected

_____ 4. Secure loose clothing and long hair when working around machinery or rotating equipment. Remove all

a. guards
b. rings and other jewelry
c. metal items that might come in contact with the equipment
d. oily rags

_____ 5. Do not block doors or

a. windows
b. traffic paths
c. access to electrical outlets
d. wheels

May be photocopied for student use.

OBJECTIVE 3

Choose the word or phrase that completes statements about basic engine functions. Write the correct letter in each blank.

_____ 1. Like automobiles, most agricultural machinery uses a(n)

a. diesel engine
b. rotary engine
c. internal combustion engine
d. four-cylinder engine

_____ 2. To operate, an engine needs

a. heat and oxygen
b. oxygen and fuel
c. fuel and electricity
d. heat and electricity

_____ 3. A small amount of fuel is channeled into the

a. cylinder
b. piston
c. spark plug
d. crankshaft

_____ 4. The spark plug is activated, a spark is produced, and

a. the crankshaft turns
b. the fuel is ignited
c. electrical current is produced
d. the piston rotates

_____ 5. The movement of the piston turns the

a. gears
b. pulleys
c. crankshaft
d. belts

OBJECTIVE 4

List basic equipment maintenance procedures. List three basic procedures.

1. ______________________________
____

2. ______________________________
____

May be photocopied for student use.

3. ______________________________________

____

OBJECTIVE 5 **Select from a list types of fuels used in agriculture.** Write an "X" in the blank before each fuel used in agricultural machinery.

_____ 1. Gasoline

_____ 2. Diesel

_____ 3. Hydroelectric

_____ 4. Geothermal

_____ 5. Natural gas

_____ 6. Ethanol and methanol

_____ 7. Hydrogen

_____ 8. Microwaves

_____ 9. Helium

_____ 10. Propane

OBJECTIVE 6 **Discuss new technologies.**

1. How will new technologies protect the farmer from danger?

____

____

____

____

____

____

____

____

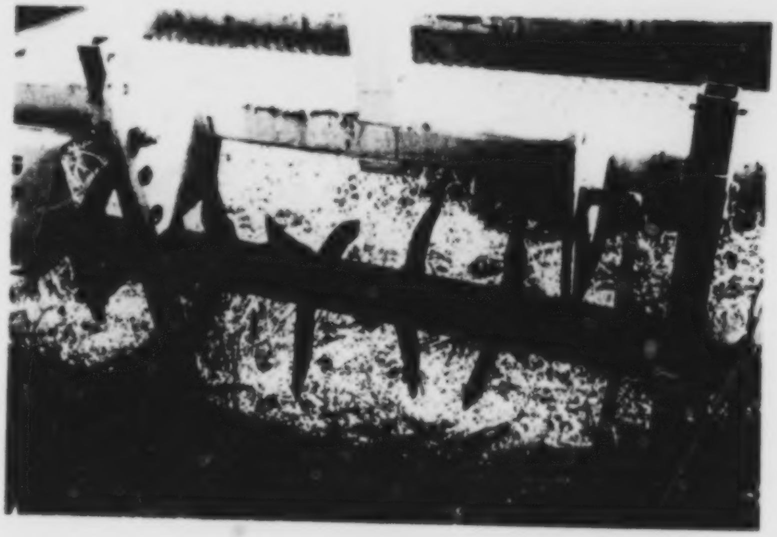
May be photocopied for student use.

2. How will new technologies protect the environment?

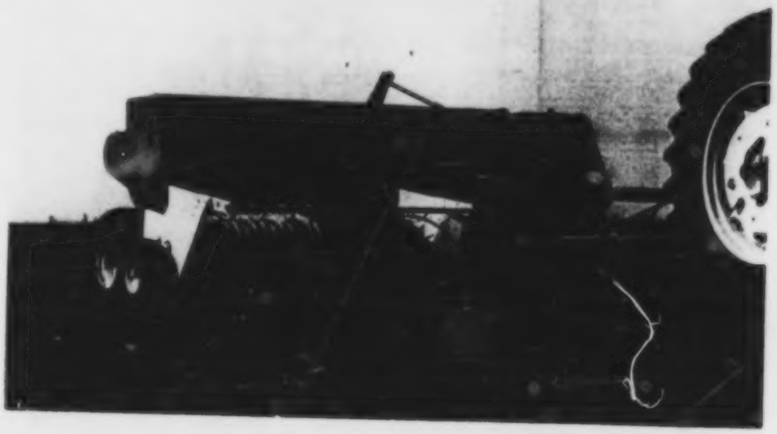
3. If you discussed new technologies in class, describe one new technology discussed and list its advantages.

May be photocopied for student use.

OBJECTIVE 7 **Label basic power equipment for agriculture.** Write the name of the equipment in the blank.



1. ______________________________



2. ______________________________

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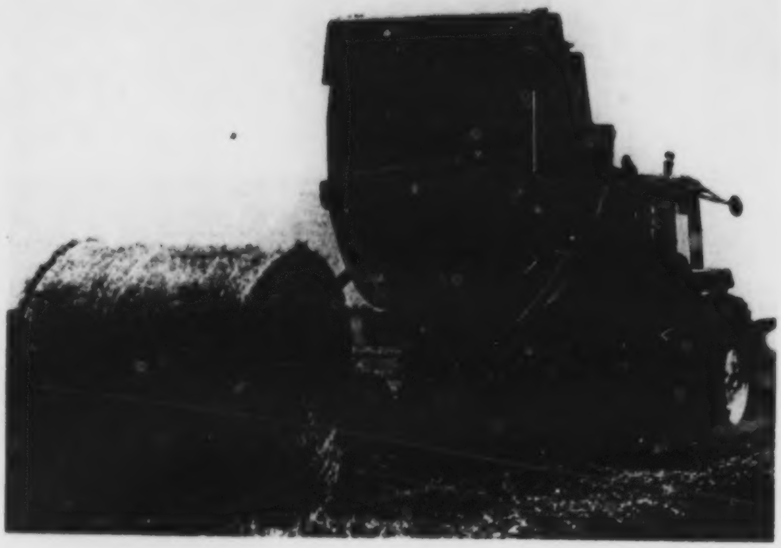
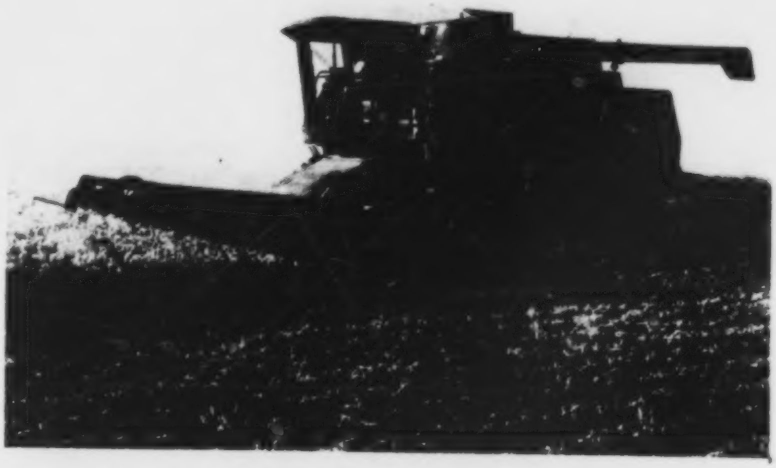


3. ____________________



4. ____________________

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5. ______________________________

6. ______________________________

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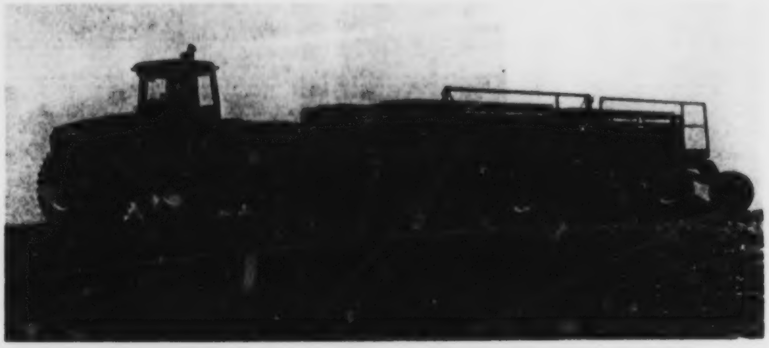

7. ______________________________

8. ______________________________

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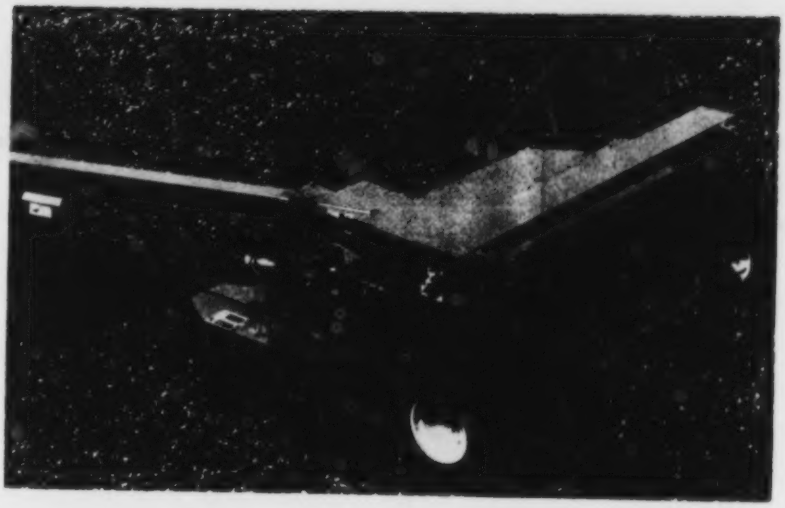
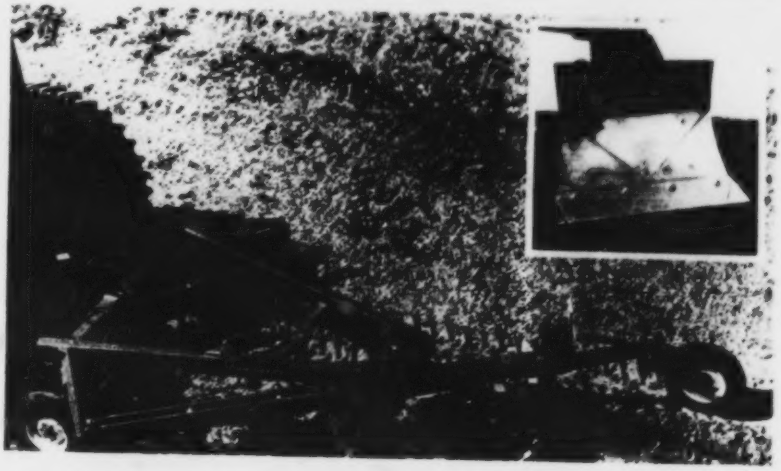


9. ______________________________



10. ______________________________

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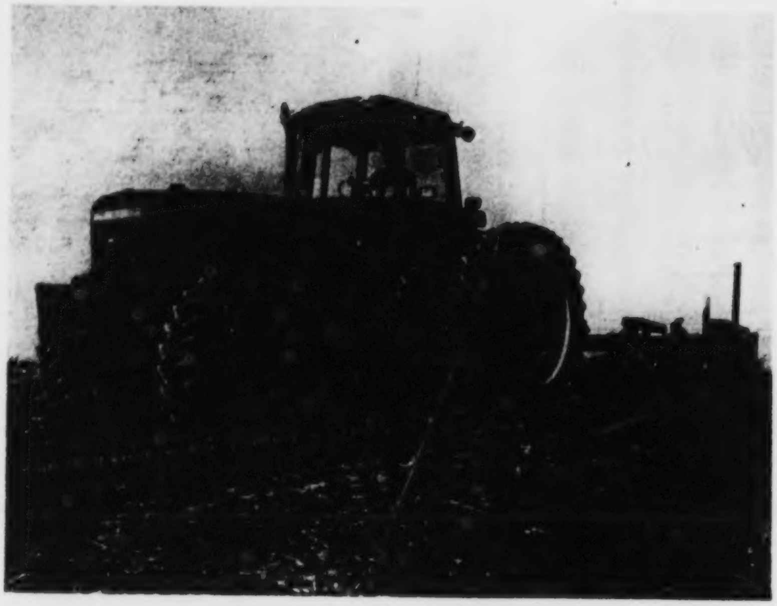

11. ______________________________

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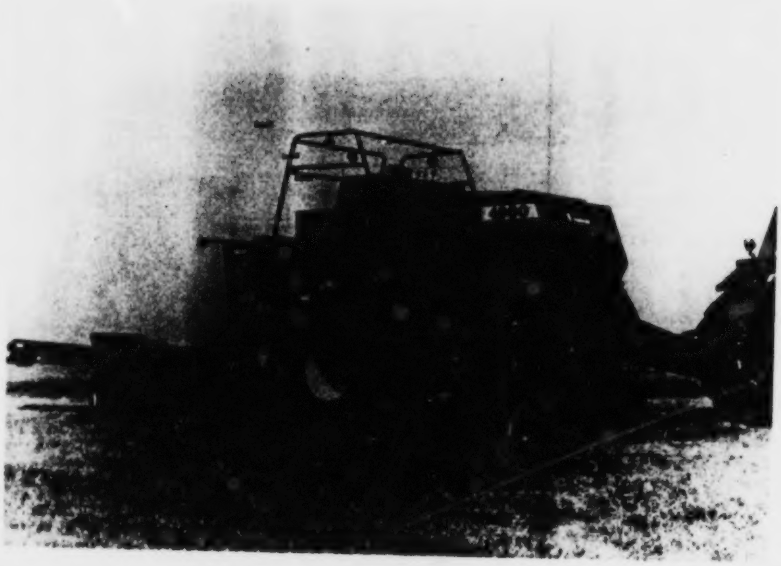

12. ______________________________

NOTE: Objectives 8 and 9 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

705

May be photocopied for student use.

WRITTEN TEST ANSWERS

AGRICULTURAL POWER

X

OBJECTIVE 1

1. b
2. g
3. c
4. e
5. l
6. m
7. f
8. d

OBJECTIVE 2

1. c
2. d
3. a
4. b
5. b

OBJECTIVE 3

1. c
2. b
3. a
4. b
5. c

OBJECTIVE 4

Answers should include any three of the following:

- Replacing lubricants and filters regularly
- Using proper fuels
- Maintaining proper inflation in all tires and replacing worn tires
- Keeping water, anti-freeze, and other fluids at their proper levels
- Replacing worn belts, spark plugs, hoses, and other parts

OBJECTIVE 5 1, 2, 5, 6, 7, 10

OBJECTIVE 6

1. Answers should include the following:
    - Robotics protect people from exposure to chemicals, temperatures, or other dangers.
    - Computers will monitor dangerous tasks.
    - Chemicals can be loaded into new sprayers so the farmer doesn't breathe or come into contact with the chemical.
    - Any other safety features discussed in class
2. Answers should include the following:
    - Computers on tractors monitor the amount of chemicals distributed.
    - Using aerators and other no-till implements will help conserve soil.
    - Fuel use can be carefully monitored and alternative fuels will be used.
3. Answers should discuss any new technology presented in class. It should also include the practical benefits of the new technology and a clear understanding of how it will benefit the farmer and agriculture.

OBJECTIVE 7

1. Aerator
2. Small square baler
3. Round baler
4. Combine
5. Field cultivator
6. Disk and Harrow
7. Drill
8. Disk, Springtooth, and Harrow
9. Swather
10. Plow
11. Tractor
12. Large square baler

OBJECTIVE SHEET

AGRICULTURAL CONSTRUCTION

XI

INTRODUCTION

Each industry has special structures that meet the industry's needs. For example, the aerospace industry has airplane hangers and space launch pads, the medical industry has hospitals and doctors' offices, the movie industry has movie sets and theaters. The agriculture industry also has structures designed and built to meet industry needs. Barns, silos, sheds, stables, and greenhouses are designed and built of materials that will meet the specific requirements for the products stored and processed or equipment maintained there.

Because they protect the products and the tools needed to produce them, structures really protect the grower's investment and future.

UNIT OBJECTIVES

After completing this unit the student will be able to identify tools and agricultural structures; describe construction stages, careers, and materials; take measurements; and use tools. The student will demonstrate these competencies by completing assignments sheets, job sheets, and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with agricultural construction to their definitions.
2. Choose the word or phrase that completes statements about basic agricultural structures.
3. List construction careers.
4. Distinguish among characteristics of building materials.
5. Label tools used in construction.
6. Discuss how computers are used in construction.
7. Read a tape measure. (Assignment Sheet 1)
8. Calculate the cost of building a fence. (Assignment Sheet 2)
9. Calculate the number of board feet needed to build a trailer floor. (Assignment Sheet 3)
10. Use a shovel. (Job Sheet 1)

11. Use a tape measure. (Job Sheet 2)
12. Drive and pull nails. (Job Sheet 3)
13. Saw a board with a rip saw and a crosscut saw. (Job Sheet 4)
14. Use a chalkline. (Job Sheet 5)

PREPARATION

- Obtain material to supplement the unit. You will need a variety of building materials, a variety of fasteners of different sizes, and tools discussed in the unit.
- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Speakers for this unit may include local construction professionals, timberframers, and lumberyard representatives. Supply speakers with specific objectives and other appropriate sections of the unit.
- Make arrangements for students to visit local construction sites; a local hardware store or lumber yard; or local buildings made of unusual materials such as logs.
- Make arrangements for any audio visual equipment that will be needed for this unit.
- Arrange to have all materials and supplies necessary to complete job sheets.
- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with agricultural construction to their definitions.

- Add to the list terms presented to the class during guest lectures or discussions.

Objective 2: Choose the word or phrase that completes statements about basic agricultural structures.

- Add to the list names of structures associated with your local area's major crops or industries.
- Have students collect magazine illustrations showing agricultural structures. Have students identify the structures and suggest uses.
- Have students photograph agricultural structures in their area. Arrange photographs on the bulletin board and have students identify the structures's uses.
- Have students read the Student Supplement.
- Use Extensions & Options to illustrate location of agricultural structures.
- Have students tour a variety of agricultural structures.
- Don't overlook agricultural structures that may be in place in your town or city or on your school property. Point them out to students and have students list other agricultural structures that can be found in urban areas. Include greenhouses, grain elevators, horse stables, veterinary center facilities, and warehouses.
- Have students complete Assignment Sheets 1-3.

Objective 3: List construction careers.

- Have students add to this list. Keep a running list posted throughout the unit and let students add to the list as they think of new careers.
- Invite representatives of as many listed positions to class as possible.
- Ask your high school's guidance counselor to provide information about construction-related careers, vocational classes offered in your area, or other related information.
- Have students complete the Activity Sheet.

Objective 4: Distinguish among characteristics of building materials.

- Have students identify the materials used in the construction of *your school.*
- Have students list the tools and supplies used with each type of material.
- Discuss the maintenance of each type of material. Discuss the benefits and liabilities of each material.
- Have students list inappropriate material choices.
- Use Transparency Masters 1, 2, and 3 to discuss details about board feet, fasteners, and nail sizes.
- Have students view structures in various stages of construction. Have the contractor, designer, or owner discuss what has been done, why, and what will be done to the structure.
- Invite a contractor to discuss what happens during each stage, how materials and design affect stages of construction, and what careers are connected with each step.
- Use Extensions & Options to illustrate how location can affect farm operations.
- Use the Student Supplement to illustrate design principles and applications.

Objective 5: Label tools used in construction.

- In Job Sheets 1-5 students will use some basic tools. You might want to have them use a wider variety of tools, mix cement, or help construct a metal shed.
- Consider having students use basic tools to construct a simple item such as a miter box or perpetual calendar.
- Show slides of tools.
- Have the students as a group construct something that can be used in the classroom such as a bookshelf.
- Invite a local retiree to share information on handling tools.
- Invite your technical education instructor to discuss tool safety.
- Have students complete Job Sheets 1-5.

Objective 6: Discuss how computers are used in construction.

- Invite a CAD technician to discuss the benefits of computer aided drafting. Explain that this technology is used not only in designing structures, but also to design cars, medical tools, and computers.
- Have students suggest future computer applications.
- Discuss how computer use can affect structure design. Modern milking parlors, fruit and vegetable warehouses, and "smart homes" are good examples.

Objective 7: Read a tape measure.

- Have students read a variety of rules and measurements in class.
- Have students write equivalent fractions (1/2 = 2/4 = 4/8 = 8/16).
- Have students devise their own unit of measure to replace an inch and prepare a rule using that measurement.
- Challenge students to accurately draw a rule showing 1/64 and 1/128 of an inch.

Objective 8: Calculate the cost of building a fence.

- Have students look at sale circulars from area lumberyards or farm supply stores. Have them compare prices and calculate the total differences between the highest and lowest prices.
- Explain that since ground is not level and wire must be tied and spliced, these figures are estimates.
- Display a wire stretcher and demonstrate its use.

Objective 9: Calculate the number of board feet needed to build a trailer floor.

- Have students calculate the perimeter and area of a building. Consider having students calculate the board feet in the structure.
- Have students calculate the number of gallons needed to paint the classroom.
- Assign a student to research the dimensions of the Great Pyramid of Cheops and have students calculate its surface area.

APPLICATION

Objective 10: Use a shovel.

Objective 11: Use a tape measure.

Objective 12: Drive and pull nails.

Objective 13: Saw a board with a rip saw and a crosscut saw.

Objective 14: Use a chalkline.

- Discuss tool care and safety rules.
- Display a wide variety of manual and power tools.
- Discuss the materials used with each tool.
- Display and discuss the use of similar tools.
- Display and discuss the use of power tools.
- Allow students plenty of opportunity to practice and to repeat sawing and nailing activities.
- Have students construct a simple individual project, such as a miter box, feed trough, wooden duck houses, or window box. Plans for a duck house are available from *Outdoor OK* magazine or from Ducks Unlimited.
- Have the class, as a group, construct benches, shelves, or other items that can be donated to the school.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Give practical test.

- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Beef Cattle Handling Facilities.* Oklahoma State University, Cooperative Extension Service and Agricultural Experiment Station, Oklahoma State University Central Mailing Services, Stillwater, OK 74078-0550 or your local county extension agent. Order no. VT63A.
- Oklahoma Department of Vocational and Technical Education, Resource Center, Attn: Instructional Media Specialist, 1500 West Seventh Avenue, Stillwater, OK 74074. The following films are available on a free-loan basis to Oklahoma teachers.

  Basic Carpentry. Proper use of power saws, drills, and sanders, as well as levels, tape measures, combination squares, and metal fasteners is discussed in this program. Also included is basic wall framing and paneling Order no. V363. (44 minutes, color, VHS)

  Bricklaying: Master the Craft. The Brick Institute of America and the National Concrete Masonry Association have developed this video for the vocational guidance program and bricklaying classes. This video will bring a new perspective to the way your students view bricklaying as a career. Order no. V168. (Color, VHS)

  Careers in Construction. Covers job duties, wages and salaries, job outlook, and education and training required in the construction field. Order no. V332. (36 minutes, color, VHS)

Power and Hand Tool Safety. This program demonstrates proper methods of selection, inspection, and use of hand tools and portable power tools, both on the job and at home. The importance of exercising judgment and control before, during, and after the job is emphasized. Order no. V215. (21 minutes, color, VHS)

Safety in the Shop Series: Hand Tools. Shows the value, in both wood and metal shops, of keeping hand tools in good condition, the need to keep saws and chisels sharp, and possible dangers from broken handles, worn tips, and burrs. Emphasizes the importance of protective clothing and demonstrates safe use of the forge and welding equipment. Order no. V563. (12 minutes, color, VHS))

Woodworking–The Easy Way. A video workshop for beginning and intermediate wood workers. The program gives step-by-step instructions by an expert who teaches woodworking classes. John Parko will teach you how to use hand and power tools along with various woodworking techniques to build a beautiful chest. Order no. V054. (130 minutes, color, VHS)

- *Woodshop Basics Video Series: Hand Tool Basics.* The American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605, 800-228-4689. Covers use of hammers, screwdrivers, pliers, vise, chisel, hand drill, various saws, etc. Order no. DR100.

Print Media

- The Cooperative Extension Service and Agricultural Experiment Stations of Oklahoma State University, Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550. Offers a large selection of publications relative to this unit. These publications also available from your local county extension agent.

- *A Young Person's Guide to Getting and Keeping a Job.* The American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605, 800-228-4689. Student and instructor tests, job preparation, hunting, and skills for young people. Order no. JW150 (text) and JW152 (instructor's).

Software

- *Reading a Ruler: English Measurements.* The American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605, 800-228-4689. Software with lessons and quizzes, teacher helps, and binder. Uses graphics and sound to teach basic units of measurement, simple, and compound fractions, and drill in reading rules. For use on Apple II computers, 48K. Order no. SS960 (5¼" format) or SS961 (3½" format).

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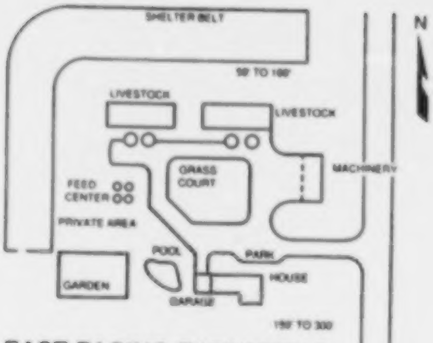
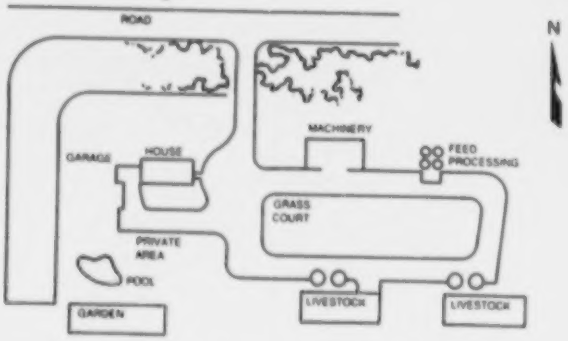
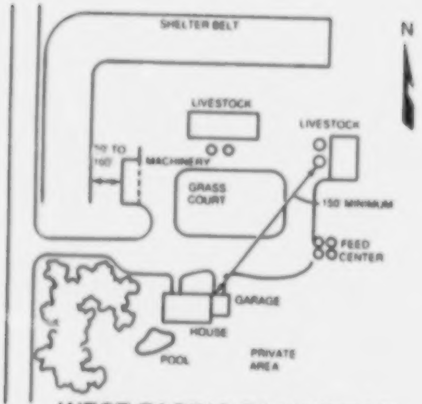
LOCATION OF AGRICULTURAL STRUCTURES


SHELTER BELT
50' TO 100'
LIVESTOCK
LIVESTOCK
GRASS COURT
MACHINERY
FEED CENTER
PRIVATE AREA
POOL
PARK
GARDEN
HOUSE
GARAGE
150' TO 300
N

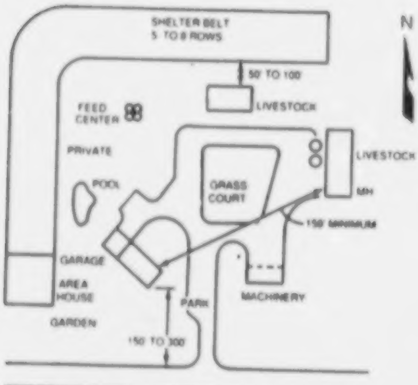
EAST FACING FARMSTEAD


ROAD
N
MACHINERY
FEED PROCESSING
GARAGE
HOUSE
GRASS COURT
PRIVATE AREA
POOL
LIVESTOCK
LIVESTOCK
GARDEN

NORTH FACING FARMSTEAD


SHELTER BELT
N
LIVESTOCK
LIVESTOCK
50' TO 100'
MACHINERY
GRASS COURT
150' MINIMUM
FEED CENTER
GARAGE
HOUSE
POOL
PRIVATE AREA

WEST FACING FARMSTEAD


SHELTER BELT 5 TO 8 ROWS
N
50' TO 100'
FEED CENTER
LIVESTOCK
PRIVATE
LIVESTOCK
POOL
GRASS COURT
MH
150' MINIMUM
GARAGE
AREA
HOUSE
PARK
MACHINERY
GARDEN
150' TO 300'

SOUTH FACING FARMSTEAD

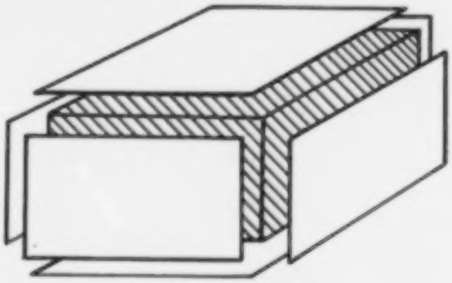
James S. Boyd, *Practical Farm Buildings*, Interstate Printers and Publishers, Inc. Used by permission.

May be photocopied for student use.

OBJECTIVE 1

Match terms associated with agricultural construction to their definitions.

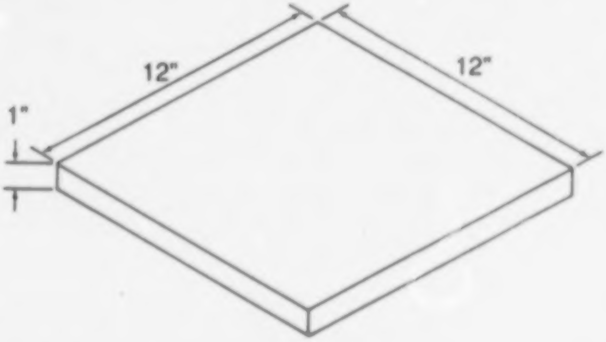
- **area** — the number of square units in a surface, calculated by multiplying length by width



Surface Area

- **barn** — an all-purpose structure used to store hay or feed, tack, equipment, and animals
- **board feet** – the volume of wood, measured as length x width x height

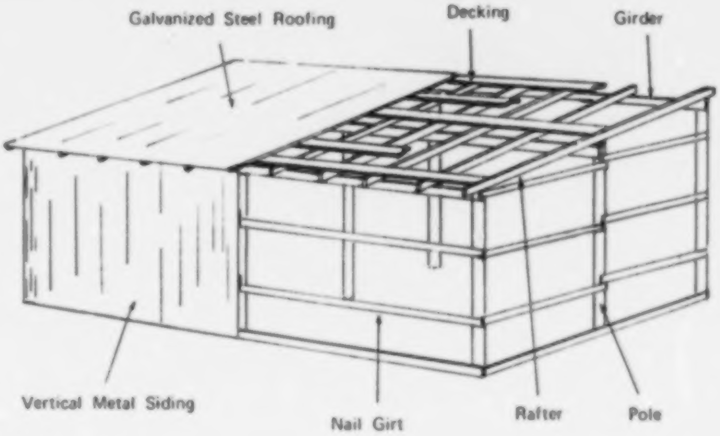
NOTE: One board foot equals 144 cubic inches.



- **greenhouse** — a structure designed to trap sunlight and use it to grow plants year-round
- **mile** – 1760 yards; 5280 feet

- **perimeter** — the distance around a structure, object, or shape

- **pole barn** — a barn built by setting wood or metal posts in the ground, then adding a roof and outer covering


Galvanized Steel Roofing
Decking
Girder
Vertical Metal Siding
Nail Girt
Rafter
Pole

NOTE: Sheds or other structures can also be built by this method.

- **silo** — a tall, round structure used to store feed and grains

NOTE: A well-built silo is airtight.

- **square footage** — the total amount of surface area in a specific structure area, measured in square feet

  NOTE: The square footage of a structure is the total amount of floor space in all levels of the structure, measured in square feet.

OBJECTIVE 2 **Choose the word or phrase that completes statements about basic agricultural structures.**

Agricultural structures house and protect agricultural machinery, products, tools, and personnel. They may be small, simple sheds, family homes, or huge, modern agricultural centers. The most basic agricultural structures include homes; buildings for dairy animals, livestock, and poultry; greenhouses; fruit/vegetable storage; grain storage; and machinery/farm sheds.

The materials used to build a structure, as well as the size, shape, and location of the structure must meet the needs of the operation. For example, a modern dairy operation requires a structure with storage for feed, disposal or storage of waste and manure, a maternity center, a corral or yard, and a milking parlor. Ventilation, electricity, and water must be available.

On the other hand, machinery storage sheds must provide security and protection from weather. Electricity, water, and specially-designed work spaces can be helpful, but are not always necessary.

Greenhouses must be located where adequate sunlight is available. Plants need careful temperature control and watering systems which require utilities and plumbing systems.

Storage buildings for fruits, vegetables and grain must protect the product until it is used, allow easy loading and unloading, and maintain the proper atmosphere. For example, grain and feed must be kept dry. Some fruit and vegetable warehouses have specialized atmosphere-control systems that monitor and regulate the amount of oxygen, carbon dioxide, and moisture in the air, as well as the temperature.

Other important agricultural structures include poultry and swine buildings and feedlots. Feedlots usually consist of many fenced areas and include a few small buildings rather than a single structure.

OBJECTIVE 3

List construction careers.

It is almost impossible to list all the construction careers related to agriculture. Some will come to mind easily, but others may surprise you. The list below is just a small sampling of the careers available.

- Architects
- Assessors
- Backhoe operators
- Building materials manufacturing and sales
- Carpenters
- Commercial contractors
- Concrete contractors and stone masons
- Construction technology professors
- Electricians
- Environmental inspectors
- Inspectors for Farmer's Home Administration, Veteran's Administration, loan agencies, or government inspectors
- Metal building sales and erection personnel
- Plumbers
- Residential contractors
- Surveyors
- Welders

OBJECTIVE 4

Distinguish among characteristics of building materials.

All structures are made of three basic materials: metal, concrete, and wood.

Metal

Metal is the most modern of the three basic materials. In some areas of the country, few metal buildings can be found. In other areas, metal buildings are preferred. They are quick and easy to construct, long-lasting, strong, and fireproof. They require little or no maintenance. Pre-fabricated metal buildings are used on many farms, as are corrugated metal buildings.

Because metal is resistant to termite damage, some buildings are now built with metal frames, even if they are finished with wood or masonry.

722

Concrete

Concrete, or masonry, structures can be built from poured or sprayed concrete, concrete blocks, bricks, or stone. Most structures have concrete foundations or floors, even if they are made of wood or metal. Concrete buildings are long-lasting. They withstand weather well and require little maintenance. They are easily cleaned and can be sterilized. Concrete can be used to build almost any shape and can support tremendous loads. Of course, it is also fireproof.

Roofs of concrete buildings must be made of wood or metal. Though little maintenance is necessary, many masonry structures or walls develop small cracks that must be repaired. Brick or stone masonry requires more time to complete and are more expensive than other materials, but are aesthetically pleasing.

Wood

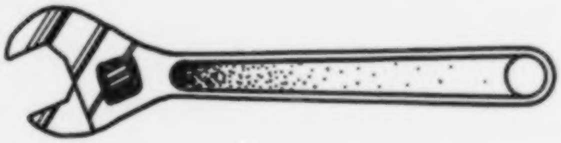
Wood has been used for centuries. Before castles were made of stone, kings lived in great wooden buildings. Wood is easy to use and is long-lasting when properly maintained. Buildings made of wood can be easily altered or added to. Wood is aesthetically pleasing.

Wooden structures have some disadvantages. Wood is not fireproof. It rots and can be damaged by weather and insects.

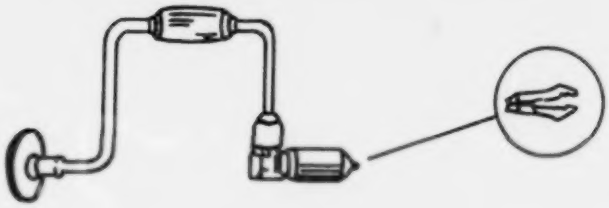
OBJECTIVE 5

Label tools used in construction.

adjustable wrench – used to hold bolts or nuts; can be adjusted to a variety of sizes



brace – used to hold an auger bit to drill holes



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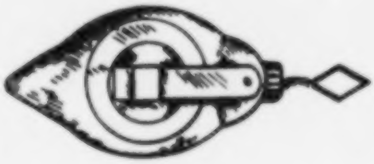
chalkline – used to mark straight lines



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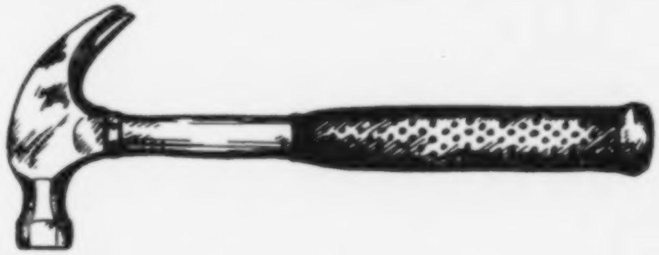
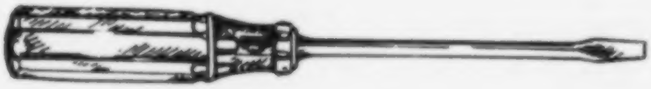
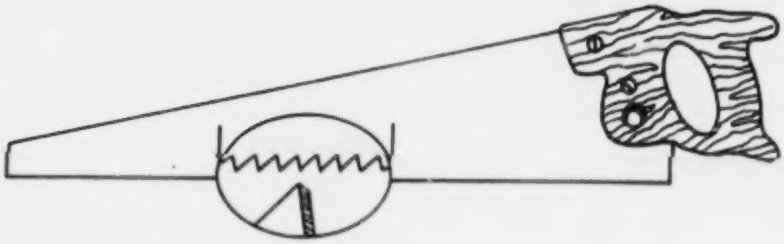
claw hammer – used to drive nails, pull nails, dismantle, and wreck



standard screwdriver – used to drive or remove standard-head screws



crosscut saw – used to cut across the grain of wood



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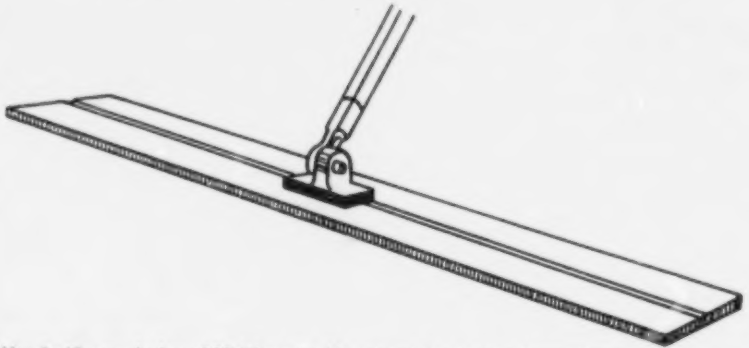
float – prepares concrete for troweling



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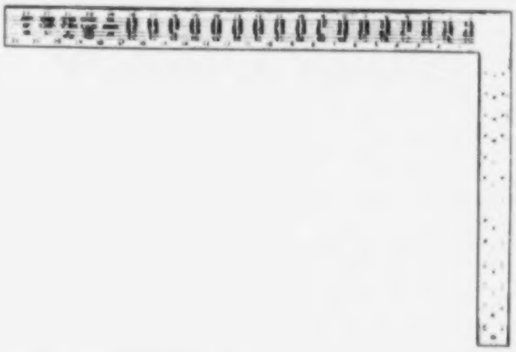
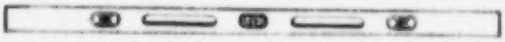
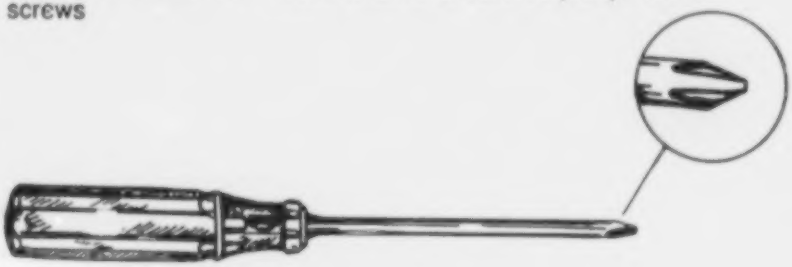
framing square – used to draw or mark right angles



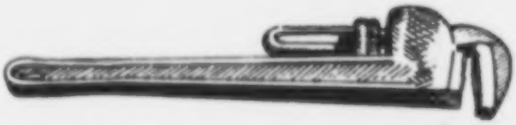
level – used to check the trueness of walls, doors, and windows



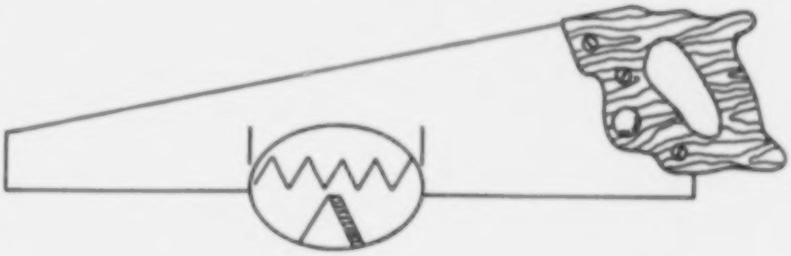
phillips screwdriver – used to drive or remove phillips-head screws



pipe wrench – used to tighten or loosen pipe joints



ripsaw – used to cut with the grain of wood



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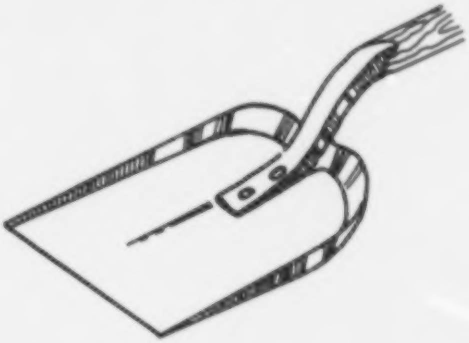
shovel – moves ready-mix concrete, sand, soil, or other materials



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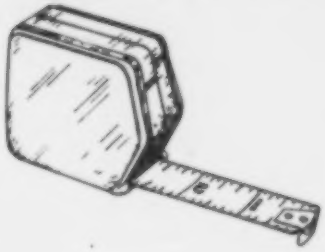
tape measure – used to measure linear distances



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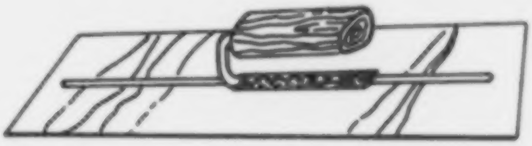
trowel – produces a smooth final finish



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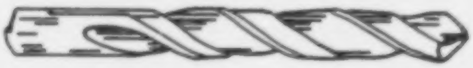
twist drill bit – used to drill holes in wood



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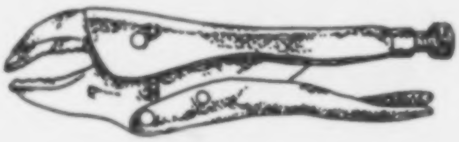
lock-grip pliers – used to grip materials; can be used to tighten or bend materials

NOTE: Lock-grips are available with a variety of jaws and clamps for holding many different types of materials.



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OBJECTIVE 6 **Discuss how computers are used in construction.**

Computers are everywhere — even in construction. One use of computer technology is computer aided drafting (CAD). By using CAD, a designer can see a structure before it is constructed. A variety of locations or design variations can be viewed and the best design choices made.

Another use of computer technology helps manufacturers precut wallboard and other materials to be shipped for individual projects. Blueprints are fed into a computer that reads the designs and determines measurements. The computer then instructs manufacturing machinery to make the cuts as designed. Even the small openings for light switches and electrical outlets can be made before the materials leave the factory!

Even purchasing more traditional materials may require the help of a computer. For example, if you decide to build a garage, you might decide to purchase a "kit." At the building center, the salesperson would enter the kit number into the computer, which would list every item needed to construct the garage, notify the salesperson if any were out of stock, and figure the cost.

What's A Board Foot?

Lumber is usually measured by the board foot (bdf) which is a volume measurement of 144 cubic inches.

Thus a piece of 1-inch board that is 12 inches long and 12 inches wide is considered 1 board foot.

Kiln-dried Lumber	
Nominal Size	Actual Size
1 x 2	¾ x 1½
1 x 3	¾ x 2½
1 x 4	¾ x 3½
1 x 6	¾ x 5½
1 x 8	¾ x 7¼
1 x 10	¾ x 9¼
1 x 12	¾ x 11¼
2 x 4	1½ x 3½
2 x 6	1½ x 5½
2 x 8	1½ x 7¼
2 x 10	1½ x 9¼
2 x 12	1½ x 11¼
4 x 4	3½ x 3½
6 x 6	5½ x 5½
8 x 8	7¼ x 7¼

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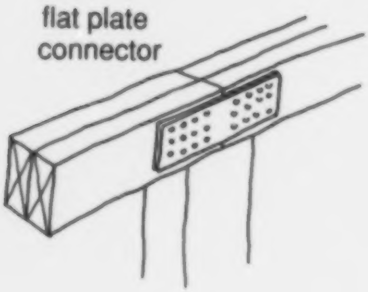
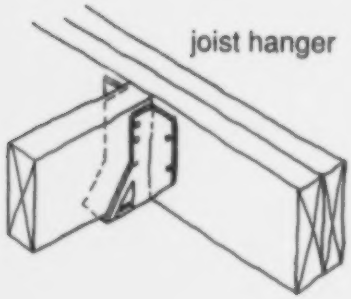
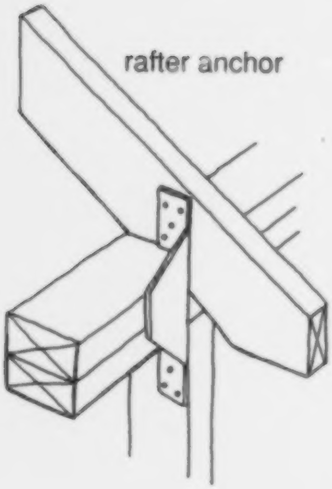
Common Steel Fastening Plates


flat plate
connector


joist hanger


rafter anchor

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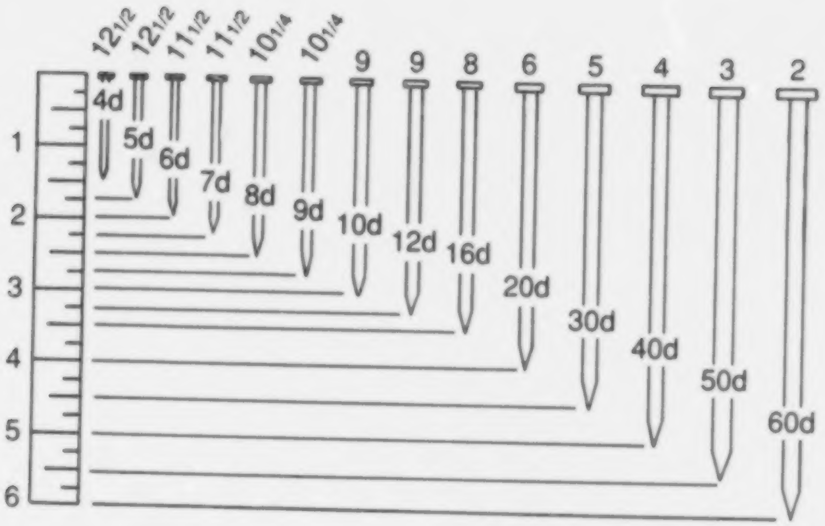
TM 3

Nail Sizes


12 1/2
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4d
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6d
7d
8d
9d
10d
12d
16d
20d
30d
40d
50d
60d
1
2
3
4
5
6

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Tabernacles and Playing Fields

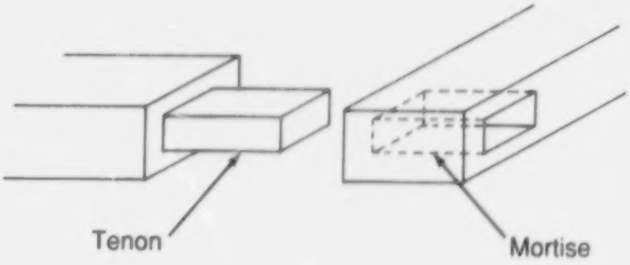
Construction can be a very creative field. Each structure is built to serve specific needs. Some needs are pretty simple, but others can be highly complex. Even the use of materials can be creative. Two American structures illustrate the way materials, design, and construction technology can be used to create useful, innovative structures.

The Mormon Tabernacle

Salt Lake City settlers had traveled more than half way across the country to settle in Utah in 1847. After drought and famine, their settlement began to prosper. Residents decided to build a church (tabernacle) using the wood and stone found in the area. The finished tabernacle seated 6,000 people and measured 150′ × 250′.

The design and construction had to meet very special limits and needs. Nails were in short supply, so the frame was to be constructed without them. The main hall had to be designed so that all 6,000 people could hear the speaker without using microphones.

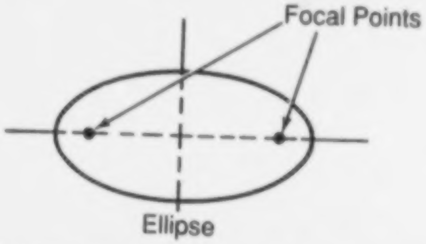
Instead of nails, workers used wooden dowels and wooden joints, called mortise and tenon cuts.



Because the structure was so large, the workers forced wooden wedges into each joint for extra stability. Then, to protect against splitting wood or loose joints, workers lashed the joints with leather strips. First they soaked the strips in water so the leather stretched, just a little. Then, the joints were tightly lashed with the strips. As they dried, the strips shrunk.

The nails they did have were used later to construct the wood-shingled roof and the tabernacle's benches.

Just as the construction method met the limits of the project, the design met the needs of the finished structure. Long before loudspeaker systems were available, members of the huge church could hear every word spoken there, even every whisper. To achieve this, the church was built in the shape of an *ellipse*. An ellipse is like a circle, only it has two focal points.



When the speaker stands at one focal point, sound waves echo throughout the structure and are amplified. This design illustrates a principle of design, **form follows function**. This means the shape of an item or structure is determined by its use.

Houston Astrodome

When the Houston Astrodome was completed in 1965, it was called "The Eighth Wonder of the Modern World." Some predicted it would collapse. They didn't believe that a clear span dome that large (642 feet) could stand. Obviously, they were wrong, but when it was built, many people agreed with them.

The idea of an indoor sports arena was suggested by a local judge, Roy Hofheinz, who had recently toured the Colosseum in Rome. While there, he was told that the ancient structure contained a covering, called a *velarium*. This cover was pulled into place by slaves when the sunlight made the crowd hot. When he returned to Houston, he began trying to sell the idea to county officials and the Houston public. Opponents, including many architects and engineers, claimed such a stadium was impossible to build. However, Hofheinz prevailed when voters approved the project by a very narrow margin, construction began, and Houston was granted a major league baseball contract.

When the Astros played their first game in 1965 (against the New York Yankees) some spectators worried that the crowd's cheering could cause the roof to collapse. As the game continued, the stability of the domed stadium was evident. Everyone was excited and pleased. Spectators were interviewed as they left the stadium. What was it like to see the first-ever indoor baseball game? How frightening was it? Did they see the roof shake or shift?

The only complaints were from the players. The skylights in the roof produced a glare that made it hard for players to see the ball. During that first season, the skylights were painted black to block the sun. Without the sun, the baseball field grass died. By the end of the season, games were played on dead grass painted green. Then next year, the Astrodome became the center of another controversy when it became the first playing field with a new surface: astroturf.

Today, the Astrodome has a connecting convention center and meeting halls. It is used for attractions such as baseball games and the Houston Livestock Show and Rodeo, the world's largest livestock event.

ACTIVITY SHEET

Development of:
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  – Collecting/recording information

  – Applying intuitive thinking techniques

  EMPLOYABILITY SKILLS

  – Investigate employment prospects of a career field/occupation

- If students have difficulty collecting/recording information:

  – Instruct them to read or examine their sources carefully, noting key words and ideas.

  – Stress the importance of recording information precisely.

- If students have difficulty applying intuitive thinking techniques:

  – Review the thinking techniques.

  – Remind them to let their thoughts flow freely and edit their ideas only after listing all their ideas.

  – Get students involved in sharing ideas with a creativity-enhancing exercise, such as listing all the uses for a clothespin or activities such as those recommended in a book on creativity.

  NOTE: *A Whack on the Side of the Head: How to Unlock Your Mind for Innovation* is a creativity activity book by Roger Von Oech and published by Warner Bocks, New York, 1983. Includes games, illustrations, exercises and self-evaluation tests.

- If students have difficulty investigating employment prospects of a career field/occupation:
  - Suggest they read current information on the career field.
  - Suggest they discuss the career field with a professional.

ACTIVITY SHEET

AGRICULTURAL CONSTRUCTION

XI

Name ____________________

Name careers involved in constructing a pole barn.

How many people does it take to build a pole barn? Well, begin with the landowner and the contractor, then list as many other people involved as you can. One hint: first think about what the pole barn is made of, then list as many jobs as you can.

Cognitive Activities Skills

- Collect/record information
- Apply intuitive thinking techniques

Job Search/ Selection Skills

- Investigate employment prospects of a career field/ occupation

ASSIGNMENT SHEET 1

Development of:
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why mathematics, science, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  MATHEMATICS SKILLS

  - Using English and metric measures
  - Making measurements

  SCIENCE SKILLS

  - Using scientific instruments (tape measure)

  EMPLOYABILITY SKILLS

  - Mastering a specific job task/procedure

- If students have difficulty using English and metric measures or making measurements:
  - Review the information in this assignment.
  - Review the English and metric systems of measurement.
  - Determine which measurement system is used on the available equipment and demonstrate its use.
- If students have difficulty using scientific instruments (tape measure):
  - Explain the major purpose of the instrument.
  - Demonstrate the use of the instrument.

- If students have difficulty mastering specific job task/procedure:
  - Review the entire procedure.
  - Examine each component of the procedure to determine which area is causing difficulty.
  - Remind them that practice makes a person proficient, and proficiency makes a person confident.

ASSIGNMENT SHEET 1

AGRICULTURAL CONSTRUCTION

XI

Name ______________________ Score __________

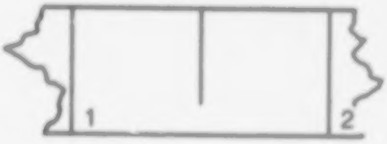
OBJECTIVE 7 **Read a tape measure.**

INTRODUCTION

Careful measurement is important to construction. Some ancient cultures used methods even more precise than those we use today. For example, the pyramids were built of blocks of stone stacked atop each other. Even today, they fit together so perfectly that a piece of paper cannot be slid between the blocks.

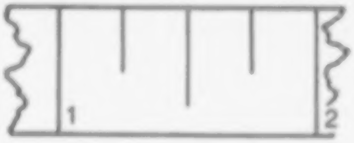
If you are not familiar with reading measurements, all those little lines can get confusing. The best way to learn to read a tape measure (or a ruler, yardstick, or meter rule) is simply to practice.

Reading rules and tape measures is based on halves. Each inch is divided into two halves. After the inch marks, these are the longest lines.



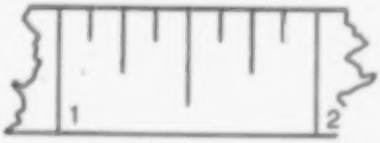
Half Marks

Each half is then divided into halves. This is the next longest line. These are the quarter inch marks.



Quarter Marks

Each quarter inch is divided into halves. This is the next longest line. These are the eighth inch marks.



Eighth Marks

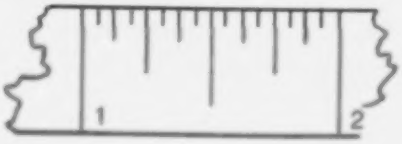
Math Application Skills
- Use English & metric measures

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

Job Acquisition/ Development Skills
- Master specific job task/procedure

Each eighth inch is divided into halves. This is the next longest line. These are the sixteenth inch marks.



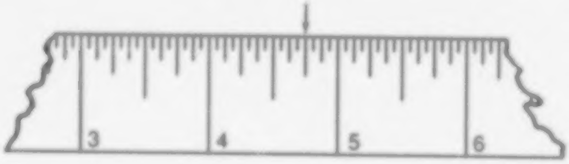
Sixteenth Marks

In some cases the rule is divided further. Each sixteenth inch is divided into halves, or 32nds of an inch.

DIRECTIONS

Read the tape measures shown below. Write the distance at the arrow to the nearest 1/16 of an inch.

1.



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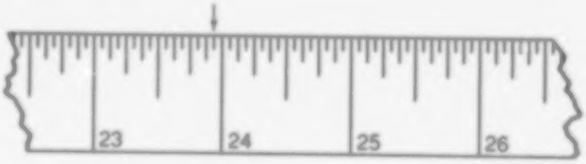
2.



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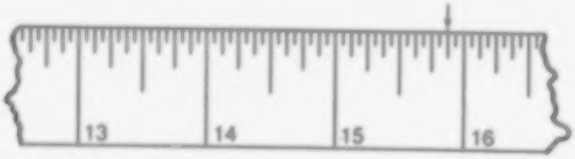
3.



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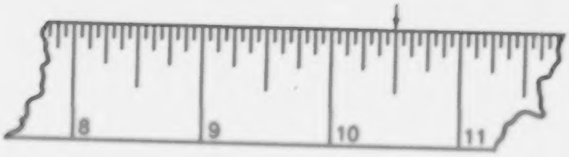
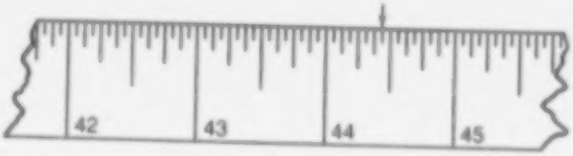
4.



5.



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ASSIGNMENT SHEET 2

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Interpreting graphics & symbols

WRITING SKILLS

- Stating ideas clearly

MATHEMATICS SKILLS

- Calculating with whole numbers
- Calculating with decimals
- Solving word problems
- Using English and metric measures
- Solving percent problems
- Applying geometry principles
- Solving practical problems
- Solving income/expense problems
- Calculating sales tax

EMPLOYABILITY SKILLS

- Mastering specific job task/procedure

- If students have difficulty interpreting graphics & symbols:
  - Discuss the information contained in the chart.
  - Examine the structure of the chart.
- If students have difficulty stating ideas clearly:
  - Remind them to use simple, concise language.
  - Instruct them to organize their thoughts before they begin writing.
- If students have difficulty calculating with whole numbers:
  - Review basic skills in addition, subtraction, multiplication, and division.
  - Remind them to check their work for accuracy.
- If students have difficulty calculating with decimals:
  - Explain that the decimal system is based on groups of ten.
  - Remind them that our money system is a decimal money system.
  - Review addition, subtraction, multiplication, and division skills using decimals.
- If students have difficulty solving word problems:
  - Remind them to read the information carefully in order to define the problem.
  - Review mathematical terminology.
- If students have difficulty using English and metric measures:
  - Review the English and metric systems of measurement.
  - Determine which measurement system is needed and demonstrate its use.
- If students have difficulty solving percent problems:
  - Inform them that the symbol "%" or the word "percent" means "per hundred."
  - Explain that to calculate 12% of an amount is another way of saying 12/100 of that amount, or 12 from each group of 100.

  - Remind them that our dollar is a good example of a percentage system. 37% of a dollar is 37/100 of a dollar or $.37.

- If students have difficulty applying geometry principles:
  - Explain that geometry is used to find area, perimeter, surface, and volume.
  - Explain that geometry is a way of measuring.
  - Discuss the importance of understanding angles and their measurement.
  - Explain that geometry is a skill that is used daily.

- If students have difficulty solving practical problems:
  - Review the information that is known.
  - Discuss the fact that mathematics skills are necessary to solve everyday problems.

- If students have difficulty solving income/expense problems:
  - Instruct them to divide the information into expenses (outgo) and income.
  - Remind them that to "compare" or to "find the difference" between two amounts they must subtract the smaller amount from the larger.

- If students have difficulty calculating sales tax:
  - Remind them that this is a necessary skill in life.
  - Stress the fact that calculating sales tax requires adequate math skills.
  - Explain that sales tax can be determined by multiplying the tax rate times the expense.
  - Explain that sales tax can be determined by using a sales tax chart.

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 2.

Name ______________________ Score __________

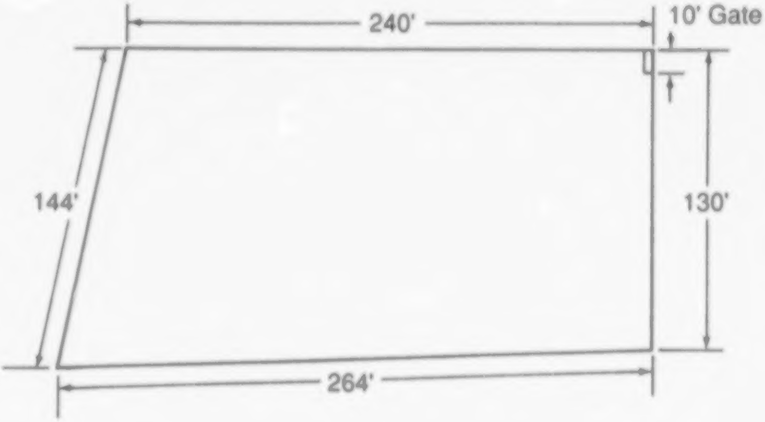
OBJECTIVE 8 **Calculate the cost of building a fence.**

INTRODUCTION

"What will it cost?" That is always an important question, especially in construction. To the owner, it might mean "How much do I have to borrow?" or "Can I have this built now, or do I have to wait another year?" If the contractor calculates the cost incorrectly, he or she may not make enough money on the job to pay for materials, equipment rental, and employee wages.

Calculating the cost of a structure is not difficult. Basically, you list all the materials, determine their cost, and add sales tax. If you are hiring contractors to do the construction, you will have to add an estimate of the labor costs. Design costs, inspection fees, and loan interest must also be added.

In this assignment sheet, you will calculate the cost of constructing a fence. Use the fence plan and price list below to calculate the cost of constructing a fence.



Functional Reading Skills
- Interpret graphics & symbols (charts, diagrams, graphs, signs, etc.)

Language Skills
- State ideas clearly

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with decimals

Math Application Skills
- Solve word problems
- Use English & metric measures
- Solve percent problems
- Apply geometry principles

Job Acquisition/ Development Skills
- Master specific job task/procedure

PRICE LIST

Corner posts	$ 3.95 each
Gates (10 feet)	$ 48.95
Fence posts	$ 1.87 each
2-point barbed wire	$ 27.95/quarter-mile roll
Wire stretchers	$ 17.95

DIRECTIONS

1. Determine the supplies you will need. If you use one post every 12 feet (4 steps), use a corner post at each corner and one each side of the gate, and use five strands of wire, what supplies will you need?

   a. How many corner posts will you need? ______

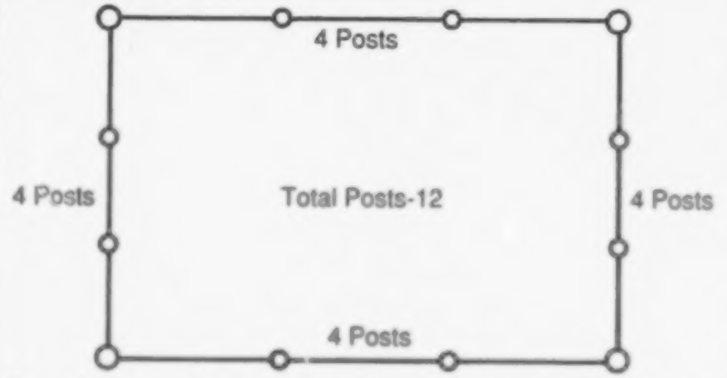
   b. How many gates will you need? ______

   c. How many posts will you need for the fence? ______

   NOTE: Divide each length by 12 and subtract 2 to determine the number of posts.

Here's a math test. How many posts would you need to fence an area with four posts on each of four sides? If you said 16 (4 x 4) you are wrong. Draw a picture of the area and you will discover that the corner posts are counted on each side, so each post is counted twice. Try again, then look at the box on the next page for the correct answer and a method to find it.

To correct your math, subtract one post from each side. Now your answer is 12 (3 × 4).



If special corner posts are used, they can't be counted at all. So to correct your math, subtract 2 from each side and you'll get 8 (2 × 4).

d. How many rolls of barbed wire will be needed? ______

NOTE: Add the lengths of each side and multiply it by the number of strands. Divide this length by the length of wire in each roll to determine how many rolls to buy. If your answer is less than one, buy one roll. If your answer includes a remainder, increase your answer by one. In this case, you are using quarter-mile rolls. A mile is 5,280 feet; a quarter mile is 1320 feet.

2. What is the total cost of supplies?

Item	Number Needed	Cost Each	Total Cost
Corner posts			
Gates			
Posts			
Rolls of wire			
Total	———	———	

3. Add cost of tools. (Assume you will need one wire stretcher) ______

4. Subtotal ______

5. Calculate 7% sales tax ______

   NOTE: To figure 7% sales tax, multiply the total by .07.

6. Total cost of erecting a fence. ______
   (Subtotal plus tax)

ASSIGNMENT SHEET 3

Development of:
READING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Following written instructions

MATHEMATICS SKILLS

- Calculating with whole numbers
- Calculating with fractions
- Calculating with decimals
- Solving formulas & equations
- Converting units of measure
- Selecting/applying mathematical procedure
- Using English & metric measures
- Applying geometry principles
- Solving practical problems

EMPLOYABILITY SKILLS

- Mastering specific job task/procedure

- If students have difficulty following written instructions:
  - Stress the importance of following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty calculating with fractions:
  - Inform them that a fraction is a portion of a whole.
  - Explain that fractions contain a top number (numerator) and a bottom number (denominator).
  - The denominator signifies how many equal pieces there are in one whole unit.
  - The numerator signifies how many of those equal units they are to consider.
  - Review basic math skills using fractions.
- If students have difficulty solving formulas and equations:
  - Discuss the importance of learning mathematical formulas.
  - Review the mathematical formulas that are relevant.
- If students have difficulty converting units of measure:
  - Discuss the fact that converting measures makes mathematics easier and quicker.

    EXAMPLE: If time was measured only in seconds and the student needed to be in class in two hours, it would be necessary to keep track of 7200 seconds.
  - Review the relevant units of measure.
  - Review the formulas for converting the relevant units of measure.
- If students have difficulty selecting/applying mathematical procedures:
  - Review the mathematical procedures that are relevant to this assignment.
  - Review mathematical terminology.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 2 and 3.

ASSIGNMENT SHEET 3

AGRICULTURAL CONSTRUCTION

XI

Name ______________________________ Score ____________

OBJECTIVE 9

Calculate the number of board feet needed to build a trailer floor.

INTRODUCTION

Knowing how much lumber is needed to complete a project is important for many reasons. It helps determine the cost of the project, speeds completion of the project, and prevents wasting money or time.

Lumber is measured in board feet. Board feet are measurements of volume–not area. It might be easier to understand the difference if you think of water. Imagine an aquarium. The area would be a measurement of the glass, but the volume would be a measurement of the amount of water the tank could hold. Board feet is a measurement of the volume of lumber in a board.

To determine board feet, or any volume, multiply the length x width x depth. For example, a 10-foot 2 x 4 would be 2 inches x 4 inches x 120 inches (the number of inches in 10 feet) or 960 cubic inches divided by 144 cubic inches (the number of cubic inches in a board foot) or 6⅔ board feet.

But a 2 x 4 is not really 2" x 4". When lumber is sold, it is measured by standard measurements, such as 2 x 4, but all lumber is slightly smaller. The actual size of a 2 x 4 is 1½ by 3½.

In this assignment sheet, you will determine the amount of lumber needed to build the floor for a grain trailer. A grain trailer should be tight, with no gaps between boards, so figure the amount using actual sizes (see Transparency Master 1). The trailer will be stronger if the boards go across the shorter side, not the longer. If an odd-sized board has to be used, keep a wide board at the back of the trailer.

Functional Reading Skills
- Follow written instructions

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with fractions
- Calculate with decimals
- Solve formulae & equations
- Convert units of measure

Math Application Skills
- Select/apply mathematical procedure
- Use English & metric measures
- Apply geometry principles

Functional Math Skills
- Solve practical problems

DIRECTIONS

Calculate the number of board feet necessary to build the floor of a 6' x 12', square-nosed grain trailer. Assume no rails or supports are needed–only the decking itself. Use only 2 x 8's and 2 x 12's.

1. Determine the actual sizes of 2 x 8's and 2 x 12's.

2 x 8's ______
2 x 12's ______

Job Acquisition/
Development Skills
- Master specific job task/procedure

2. Divide the length of the trailer in inches by the width of the 2 x 12's. Ignore any remainder. This will give you the total number of 2 x 12's needed.

   NOTE: Remember, run the boards from side to side to give the floor more stability.

   Total number of 2 x 12's needed ______

3. If you got a remainder, you should determine how much space will not be covered by 2 x 12's. For example, if your answer to question 2 was 6.3, multiply the actual width of the 2 x 12 by 6 and subtract it from the length of the trailer. ______

4. If your answer is more than 8", you will need two 2 x 8's; if it is 8" or less, you will only need one.

   Total number of 2 x 8's needed ______

5. If you were to go to the lumber yard at this point, you would be asked the number of board feet.

   a. Multiply the width of the trailer in inches by 2. ______

   b. Multiply that answer by 12. ______

   c. Multiply that answer by the number of 2 x 12's you need. ______

   d. Divide by 144 to get the total 2 x 12 board feet. ______

   e. Multiply the width of the trailer in inches by 2. ______

   f. Multiply that answer by 8. ______

   g. Multiply that answer by the number of 2 x 8's you need. ______

   h. Divide by 144 to get the total 2 x 8 board feet. ______

6. The total number of 2 x 12 board feet ______

7. The total number of 2 x 8 board feet ______

ASSIGNMENT SHEET 1

1. 4¾ inches
2. 23 15/16 inches
3. 15 7/8 inches
4. 10½ inches
5. 44 7/16 inches

ASSIGNMENT SHEET 2

1. a. 6

   b. 1

   c. 240 ÷ 12 = 20, 20 - 2 = 18 posts
   144 ÷ 12 = 12, 12 - 2 = 10 posts
   264 ÷ 12 = 22, 22 - 2 = 20 posts
   130 - 10 (length of gate) = 120, 120 ÷ 12 = 10, 10 - 2 = 8 posts
   18 + 10 + 20 + 8 = 56 posts

   d. 240 + 144 + 264 + 130 - 10 = 768
   768 x 5 = 3840
   3840 ÷ 1320 = 2.9 = 3 rolls

2.

Item	Number Needed	Cost Each	Total Cost
Corner posts	6	$ 3.95	$23.70
Gates	1	$48.95	48.95
Posts	56	$ 1.87	104.72
Rolls of wire	3	$27.95	83.85
Total	———	———	$261.22

3. $17.95
4. $279.17
5. $19.54
6. $298.71

ASSIGNMENT SHEET 3

1. 1½ x 7¼
   1½ x 11¼
2. 144" ÷ 11¼ = 12
3. 144" - 135" = 9"
4. 2
5. a. 72" x 2 = 144"
   b. 1728"
   c. 20736"
   d. 144
   e. 72" x 2 = 144"
   f. 1152"
   g. 2304
   h. 16
6. 144
7. 16

JOB SHEET 1

Development of:
READING SKILLS
MATHEMATICAL SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  MATHEMATICS SKILLS

  - Applying geometry principles

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Practicing good work habits/attitudes

- If students have difficulty practicing good work habits/attitudes:
  - Make sure the students know what is expected of them.
  - Stress the importance of good work habits/attitudes in obtaining and retaining employment.
- For additional suggestions for teaching basic skills, refer to Instructional Supplements 2, 3, and 4.

JOB SHEET 1

AGRICULTURAL CONSTRUCTION

XI

OBJECTIVE 10

Use a shovel.

INTRODUCTION

You will need to know how to use a shovel to do many things from planting a tree to breaking ground for a new building. It will be important that you know how to use a shovel correctly. This job sheet will help you learn the proper way to handle and use a shovel.

EQUIPMENT AND SUPPLIES

- Shovel
- Loose dirt
- Pail or wheelbarrow

PROCEDURE

Functional Reading Skills
- Follow written instructions

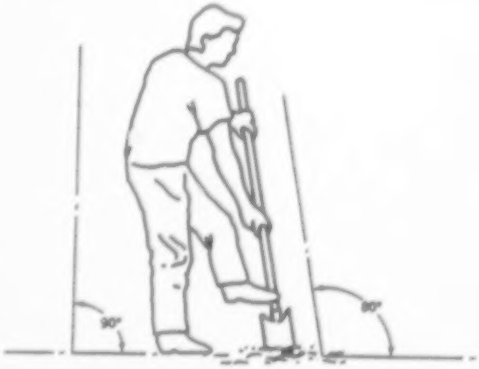
Math Application Skills
- Apply geometry principles

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

1. Hold the shovel with your right hand on the end of the handle and your left hand about halfway between the end and shovel head.

   NOTE: Reverse hand positions if you are left handed.

2. Force the head of the shovel into the ground at about an 80° angle.



3. Place your right foot on the shovel head next to the handle. Push downward with your right leg.

   NOTE: Never use a shovel in bare or stocking feet.

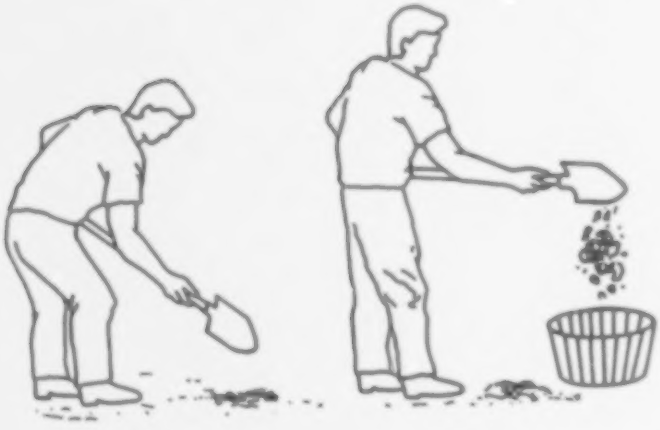
4. Lift the shovel. Do not spread your hands further apart. If the shovel is heavy, use your legs for lifting strength, not your back.

5. Put soil in a pail or a wheelbarrow.

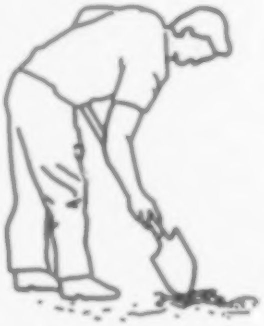
6. Rotate the handle with your wrists to drop dirt into a container.

7. Have your instructor check your work.

8. Clean your work area and put tools away.



Correct



Incorrect

JOB SHEET 2

Development of:
READING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, and employability skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Calculating with fractions
  - Using English and metric measures
  - Making measurements

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Practicing good work habits/attitudes

- For additional suggestions for teaching basic skills, refer to Instructional Supplements 2, 3, 4, and 5.

JOB
SHEET 2

AGRICULTURAL CONSTRUCTION

XI

OBJECTIVE 11

Use a tape measure.

INTRODUCTION

To build any type of item, you will need accurate and precise measurements or the item may not turn out as you had planned. By learning to use a tape measure properly, you will master a necessary measurement skill. This job sheet will assist you in learning this skill.

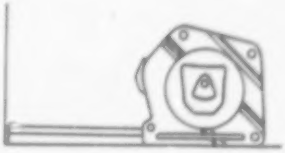
EQUIPMENT AND SUPPLIES

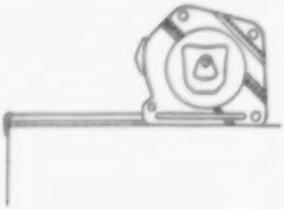
- Tape measure
- Pencil and paper

PROCEDURE

1. Place the tape end against one wall of your classroom. Have another student hold the end.
2. Pull the tape to the opposite wall so that the tape measure casing is against the wall.

   NOTE: The ring on the end of the tape is part of the first inch. Tape goes against corner or over edge.





Functional Reading Skills
- Follow written instructions

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with fractions

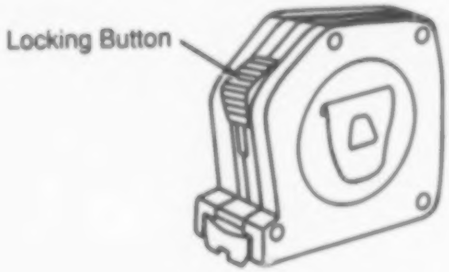
Math Application Skills
- Use English & metric measures

Functional Math Skills
- Make measurements

Job Acquisition/ Development Skills

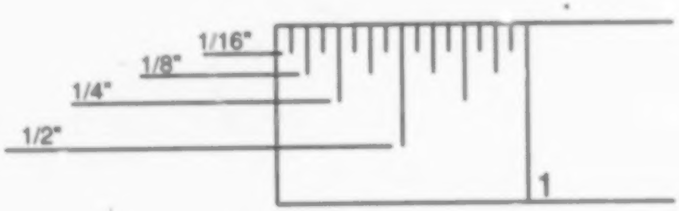
- Master specific job task/procedure
- Practice good work habits/attitudes

3. Push the locking button down.



4. Find the last inch number visible. Write that number down.

5. Find the line closest to the tape casing. Use the key below to find what fraction of an inch that line represents.



6. Write it down.

7. Look at the bottom of the tape casing. It will list the width of the casing.

8. Write this number down.

9. Add the three numbers together to get the length of your classroom.

   1. Inches (step 4) ______
   2. Fractions (steps 5-6) ______
   3. Width of casing (steps 7-8) ______

   Total ______

10. Have your instructor check your work.

11. Clean your work area and put tools away.

JOB SHEET 3

Development of:
READING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  EMPLOYABILITY SKILLS

  - Mastering a specific job task/procedure
  - Practicing good work habits/attitudes
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 2, 4, and 5.

OBJECTIVE 12 **Drive and pull nails.**

INTRODUCTION

Learning to correctly drive and pull nails will help you make sure your building projects look good and stay together. This job sheet will help you learn the proper way to work with nails.

EQUIPMENT AND SUPPLIES

- Nails
- Blocks of wood
- Curved claw hammer

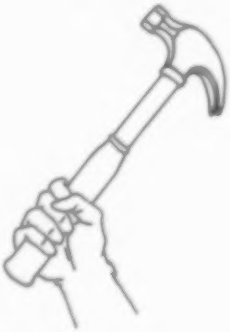
PROCEDURE

Functional Reading Skills
- Follow written instructions

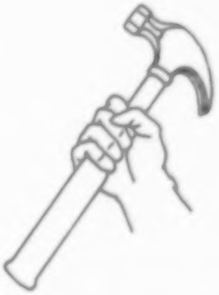
Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

1. Grasp the hammer at the end of the handle.

CORRECT



INCORRECT



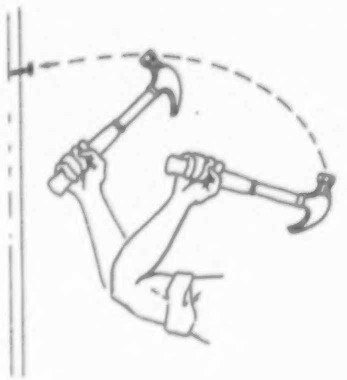
2. Hold a nail between your thumb and forefinger with the head down.
3. Place the head of the nail on your work surface, head down.
4. Tap the point of the nail with the hammer one time.

   NOTE: This will slightly dull the point and help prevent splitting the wood.
5. Turn the nail over, with the point on the piece of wood.
6. Hold the nail with your thumb and forefinger.
7. Gently tap the nail with the hammer until the nail will stand on its own.
8. Hold the piece of wood firmly.

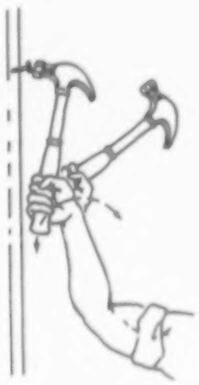
9. Strike the head of the nail with the hammer.

10. Keep your wrist stiff and swing from your elbow.

CORRECT



INCORRECT



11. Drive the nail completely into the wood.

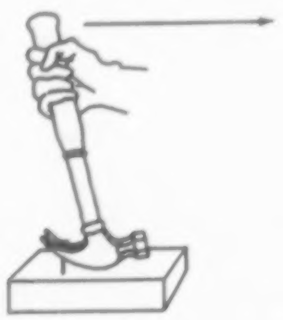
12. Repeat steps 1-5, only do not drive the second nail all the way into the wood.

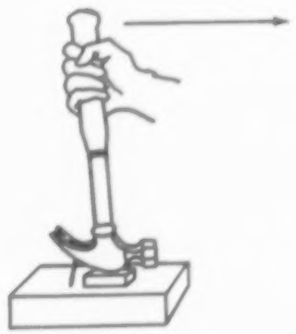
13. Slide the claw of the hammer under the head of the nail.

NOTE: If there is not enough space between the nail head and the wood, slide one end of the claw under the head.

14. Hold the end of the hammer handle with one hand and the piece of wood with the other. If the head of the nail is too far above the wood, place another piece of wood next to the nail and place the hammer on it.

15. Pull the hammer toward you.





16. Readjust the claw hammer and wood pieces as necessary until

17. Have your instructor check your work.

18. Clean your work area and put tools away.

JOB SHEET 4

Development of:
READING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  MATHEMATICS SKILLS

  - Using English and metric measures
  - Applying geometry principles
  - Making measurements

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Practicing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 2, 3, 4, and 5.

JOB SHEET 4

AGRICULTURAL CONSTRUCTION

XI

OBJECTIVE 13

Saw a board with a rip saw and a crosscut saw.

INTRODUCTION

Saws play a very important part in agricultural construction. This job sheet will familiarize you with two types of saws and how to use them.

EQUIPMENT AND SUPPLIES

- Rip saw
- Cross-cut saw
- Board
- Pencil
- Combination square

PROCEDURE

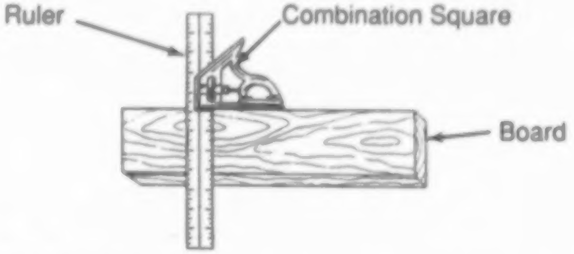
Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English & metric measures
- Apply geometry principles

Functional Math Skills
- Make measurements

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

1. Place the combination square on the board, forming a 90° angle from the side of the board across the top board surface.

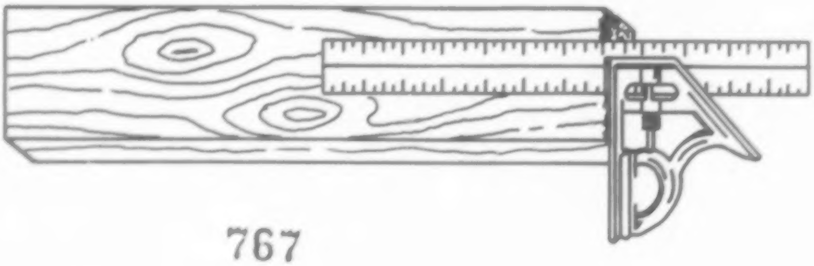


2. Mark a line 3 inches long against the straightedge of the combination square.

3. Move the combination square to a sawed end of the board.

4. Place the combination square on the board, forming a 90° angle from the sawed edge of the board surface.

5. Mark a line 3 inches long against the straightedge of the combination square.

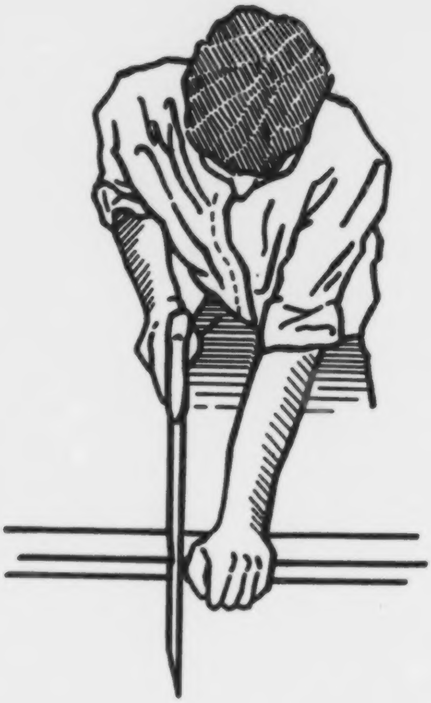


6. Place the board on your work area. Place it so that the portion of the board with first line is hanging off the edge of the work surface, but most of the board remains on the surface.

7. Put your weight on the portion of the board resting on the work surface.

8. Hold the crosscut saw like a pistol.

9. Guide the saw by keeping one knuckle along the flat side of the blade as you saw.



10. Saw with the crosscut saw. Saw about 3 inches down the first line.

    a. Place the butt portion of the saw (near the handle) on the wood, on the outside of the line. Do not saw on the line.

       NOTE: The blade will remove a narrow portion of wood, called the *kerf.* When working on a project, always mark the waste portion and make the cut on that side of the line. Never saw directly on the line, but try to leave it on the board.

    b. Make two or three light, **pulling** strokes to begin the cut.

    c. Hold the saw at about a 45° angle.

   d. Make long, even cuts. Let the saw cut smoothly; avoid jerking or forcing the blade.

      NOTE: Do not bear down or add pressure as you saw.

11. Move the board so the portion of the board with the second line is hanging off the edge of the work surface, but most of the board remains on the surface.

12. Put your weight on the portion of the board resting on the work surface.

13. Hold the ripsaw like a pistol.

14. Guide the saw by keeping one knuckle along the side of the blade as you saw.

15. Saw with the ripsaw. Saw about 3 inches down the line.

    a. Place the tip portion of the saw (away from the handle) on the wood, to one side of the line. Saw outside the line.

    b. Make two or three short, **pulling** stokes to begin the cut.

    c. Hold the saw at about a 60° angle from the board.

    d. Make long, even cuts.

16. Have your instructor check your work.

17. Clean your work area and put tools away.

JOB SHEET 5

Development of:
READING SKILLS
MATHEMATICS SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  MATHEMATICS SKILLS

  - Using English and metric measures
  - Making measurements

  EMPLOYABILITY SKILLS

  - Mastering specific job task/procedure
  - Practicing good work habits/attitudes

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 2, 4, and 5.

OBJECTIVE 14 **Use a chalkline.**

INTRODUCTION

Chalklines are used to mark straight lines on a surface. Using a chalkline will help you make sure you have a straight line to work with. This job sheet will help you learn to use a chalkline properly.

EQUIPMENT AND SUPPLIES

- Chalkline
- Surface to mark
- Measuring tape

PROCEDURE

1. Measure each side of the surface to be marked.
2. Divide the length in half.
3. Mark the half-way point on each side of the surface.
4. Hook the chalkline hook at the halfway point on one end of the surface to be marked.

   NOTE: If no hooking place is available, have another student hold the chalk line.
5. Pull the chalkline to the other end of the surface and hold it there.
6. Pull the line tight and straight.
7. With a thumb and forefinger, pull the line a few inches above the surface.
8. Let go, snapping the line against the surface.
9. Use the rewinding crank to rewind the line.
10. Have your instructor check your work.
11. Clean your work area and put tools away.

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English & metric measures

Functional Math Skills
- Make measurements

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

PRACTICAL TEST 1

AGRICULTURAL CONSTRUCTION XI

JOB SHEET 1

Use a shovel.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Held the shovel with right hand on the end of the handle and left hand about halfway between the end and shovel head	___	___
2. Forced the head of the shovel into the ground at about an 80° angle	___	___
3. Placed right foot on the shovel head next to the handle and pushed downward with right leg	___	___
4. Lifted the shovel without spreading hands further apart	___	___
5. Used legs for lifting strength and carried the dirt to a pail or wheelbarrow	___	___
6. Rotated the handle with wrists to drop dirt into container	___	___
7. Used proper tools correctly	___	___
8. Performed steps in a timely manner	___	___

9. Practiced safety rules throughout procedure ___ ___

10. Provided satisfactory responses to questions asked ___ ___

11. Put tools away and cleaned work area ___ ___

EVALUATOR'S COMMENTS

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PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Performed task	4	3	2	1

EVALUATOR'S COMMENTS

____

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AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 2

Use a tape measure.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Placed the tape end against one wall of the classroom. Had another student hold the end	___	___
2. Pulled the tape to the opposite wall	___	___
3. Pushed the locking button down	___	___
4. Found the last inch number visible and wrote it down	___	___
5. Found the line closest to the tape casing, determined its value, and wrote it down	___	___
6. Looked at the bottom of the tape casing, determined casing width, and wrote it down	___	___
7. Added the three numbers together to get the classroom length	___	___
8. Used proper tools correctly	___	___
9. Performed steps in a timely manner	___	___

10. Practiced safety rules throughout procedure ___ ___

11. Provided satisfactory responses to questions asked ___ ___

12. Put tools away and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

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____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Followed procedure instructions	4	3	2	1
Practiced safety rules	4	3	2	1
Completed task	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3

AGRICULTURAL CONSTRUCTION

XI

JOB SHEET 3

Drive and pull nails.

Student's name ______________________ Date __________

Evaluator's name ______________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Grasped hammer at the end of the handle	___	___
2. Held a nail between thumb and forefinger	___	___
3. Placed the head of the nail on work surface	___	___
4. Tapped the point of the nail with the hammer one time	___	___
5. Turned the nail over, with the point on the piece of wood; held the nail with thumb and forefinger	___	___
6. Gently tapped the nail with the hammer until the nail would stand on its own	___	___
7. Held the piece of wood firmly	___	___
8. Struck the head of the nail with the hammer	___	___

9. Kept wrist stiff and swung from elbow ___ ___

10. Drove the nail completely into the wood ___ ___

11. Repeated steps 1-5, but only drove the second nail partially into the wood ___ ___

12. Slid the claw of the hammer under the head of the nail ___ ___

13. Held the end of the hammer handle with one hand and the piece of wood with the other ___ ___

14. If the head of the nail was too far above the wood, placed another piece of wood next to the nail and placed the hammer on it ___ ___

15. Pulled the hammer ___ ___

16. Readjusted the hammer and wood pieces as necessary until the nail was removed ___ ___

17. Used proper tools correctly ___ ___

18. Performed steps in a timely manner ___ ___

19. Practiced safety rules throughout procedure ___ ___

20. Provided satisfactory responses to questions asked ___ ___

21. Put tools away and cleaned work area ___ ___

EVALUATOR'S COMMENTS ____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Followed instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed task	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 4

Saw a board with a rip saw and a crosscut saw.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Placed the combination square on the board, forming a 90° angle from the side of the board across the top board surface	___	___
2. Marked a 3-inch line against the straightedge of the combination square	___	___
3. Moved the combination square to a sawed end of the board	___	___
4. Placed the combination square on the board, forming a 90° angle from the sawed edge of the board surface	___	___
5. Marked a 3-inch line against the straightedge of the combination square	___	___
6. Placed board on work area so that most of the board remained on the work surface	___	___

7. Put weight on the portion of the board resting on the work surface ___ ___

8. Held the crosscut saw like a pistol ___ ___

9. Guided the saw by keeping one knuckle along the flat side of the blade ___ ___

10. Sawed with the crosscut saw 3 inches down the first line ___ ___

    a. Placed the butt portion of the saw on the outside of the line ___ ___

    b. Made two or three light, pulling strokes to begin the cut ___ ___

    c. Held the saw at about a 45° angle ___ ___

    d. Made long, even cuts without jerking or forcing the blade ___ ___

11. Moved the board so the portion of the board with the second line hung off the edge of the work surface, but most of the board remained on the work surface ___ ___

12. Put weight on the portion of the board resting on the work surface ___ ___

13. Held the ripsaw like a pistol ___ ___

14. Guided the saw by keeping one knuckle along the side of the blade ___ ___

15. Sawed with a ripsaw about 3 inches down the second line ___ ___

    a. Placed the tip portion of the saw on the wood to one side of the line ___ ___

    b. Sawed outside of the line ___ ___

    c. Held the saw at about a 60° angle from the board ___ ___

    d. Made long, even cuts ___ ___

16. Performed steps in a timely manner ___ ___

17. Practiced safety rules throughout procedure ___ ___

18. Provided satisfactory responses to questions asked ___ ___

19. Put tools away and cleaned work area ___ ___

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed task	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

JOB SHEET 5

Use a chalkline.

Student's name ______________________ Date __________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Measured each side of the surface to be marked	___	___
2. Divided the length in half	___	___
3. Marked the half-way point on each side of the surface	___	___
4. Hooked the chalkline hook on one end of the surface to be marked	___	___
5. Pulled the chalkline to the other end of the surface and held it there	___	___
6. Pulled the line tight and straight	___	___
7. With a thumb and forefinger, pulled the line a few inches above the surface	___	___
8. Let go, snapping the line against the surface	___	___
9. Used the rewinding crank to rewind the line	___	___

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10. Used proper tools correctly ___ ___

11. Performed steps in a timely manner ___ ___

12. Practiced safety rules throughout procedure ___ ___

13. Provided satisfactory responses to questions asked ___ ___

14. Put tools away and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed task	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

AGRICULTURAL CONSTRUCTION

XI

Name _______________ Score _______

OBJECTIVE 1

Match terms associated with agricultural construction to their definitions. Write the correct letter in each blank.

_____ 1. The total amount of surface area in a specific structure area, measured in square feet

_____ 2. The volume of wood, measured as length x width x height

_____ 3. The number of square units in a surface, calculated by multiplying length by width

_____ 4. 1760 yards; 5280 feet

_____ 5. The distance around a structure, object, or shape

_____ 6. An all-purpose structure used to store hay or feed, tack, equipment, and animals

_____ 7. A structure designed to trap sunlight and use it to grow plants year-round

_____ 8. A barn built by setting wood or metal posts in the ground, then adding a roof and outer covering

_____ 9. A tall, round structure used to store feed and grains

a. area

b. assessment

c. barn

d. board feet

e. diameter

f. floor space

g. greenhouse

h. mile

i. perimeter

j. pole barn

k. shed

l. silo

m. square footage

n. stable

o. survey

p. watershed

May be photocopied for student use.

OBJECTIVE 2 **Choose the word or phrase that completes statements about basic agricultural structures.** Write the correct letter in the blank.

_____ 1. The most basic agricultural structures include homes; buildings for dairy animals, livestock, and poultry; greenhouses; fruit/vegetable storage; grain storage; and

a. homes
b. fences
c. machinery/farm sheds
d. processing plants

_____ 2. The materials used to build a structure, as well as the size, shape, and location of the structure must

a. meet the needs of the operation
b. meet inspection guidelines
c. is aesthetically pleasing
d. is selected by a professional

_____ 3. Feedlots usually consist of many fenced areas and include

a. a central building
b. a few small buildings
c. a series of connecting structures
d. a large, central barn

_____ 4. Storage buildings for fruits, vegetables, and grains must protect the product until it is used, allow easy loading and unloading, and

a. be near a major road
b. seal completely with no ventilation
c. maintain the proper atmosphere
d. have running water

OBJECTIVE 3 **List construction careers.** List five careers in the spaces below.

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

May be photocopied for student use.

OBJECTIVE 4

Distinguish among characteristics of building materials. Write an "M" in the blanks before statements about metal; a "C" in the blanks before statements about concrete; and a "W" in the blanks before statements about wood. If more than one answer is correct, list all correct answers.

_____ 1. The most modern of the three basic materials

_____ 2. Requires little maintenance

_____ 3. Easily cleaned and can be sterilized

_____ 4. Quick and easy to construct

_____ 5. Can be used to build almost any shape

_____ 6. Used in some frames because it is resistant to termite damage

_____ 7. Has been used for centuries and was used to build the first castles

_____ 8. Fireproof

_____ 9. Can be easily altered or added to

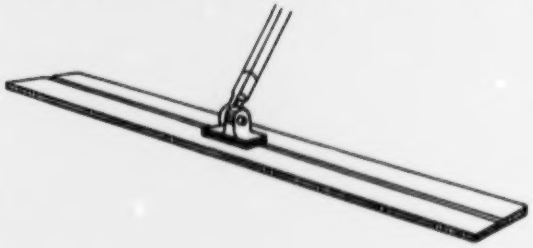
_____ 10. Used in prefabricated buildings

_____ 11. Can support tremendous loads

_____ 12. Used in most structures for foundations or floors

OBJECTIVE 5

Label tools used in construction. Write the names in the blanks.



1. ______________________________

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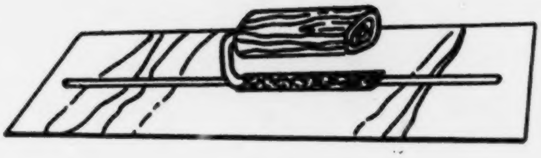
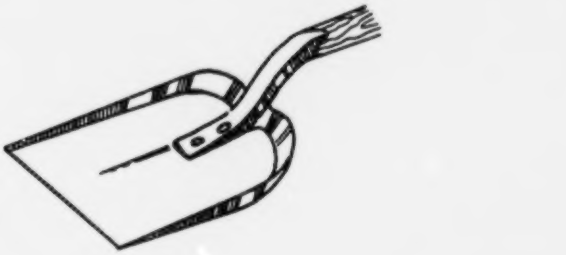
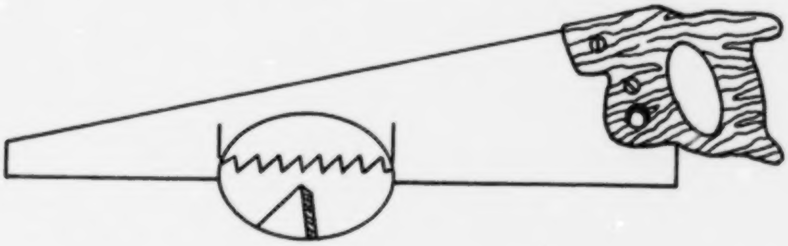


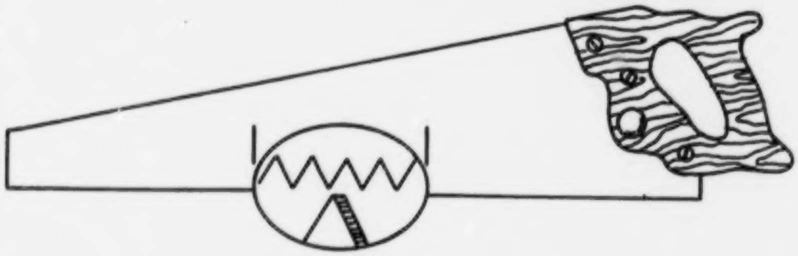
2. ____



3. ____



4. ____



5. ____

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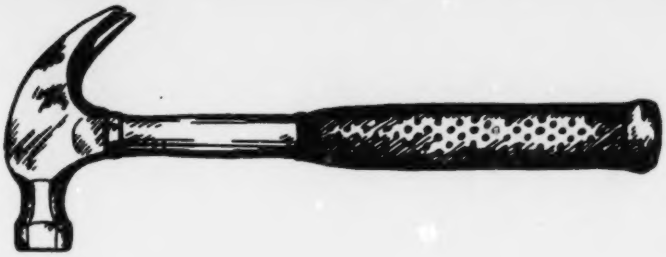
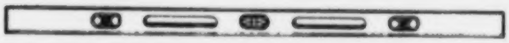
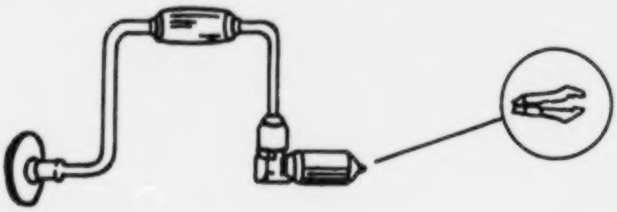


6. ______________________________



7. ______________________________



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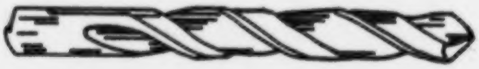

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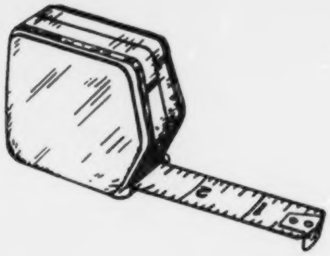

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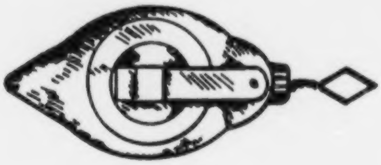

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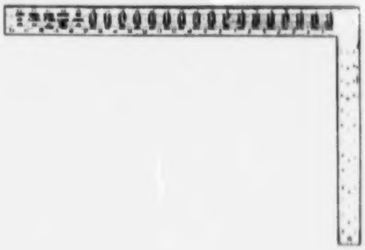

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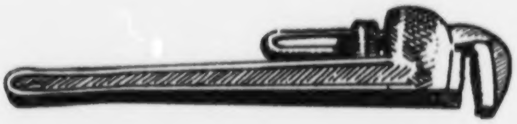

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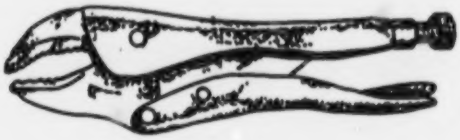

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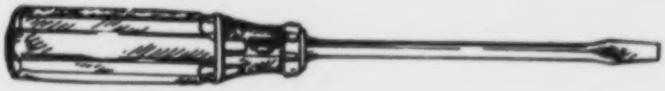

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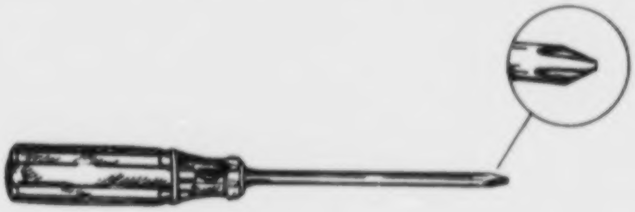

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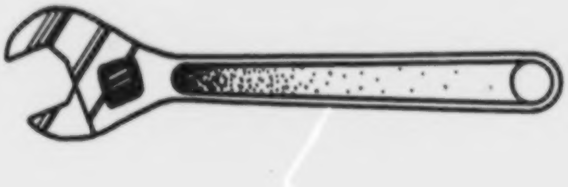

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OBJECTIVE 6 **Discuss how computers are used in construction.**

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NOTE: Objectives 7-14 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

AGRICULTURAL CONSTRUCTION

XI

OBJECTIVE 1

1. m
2. d
3. a
4. h
5. i
6. c
7. g
8. j
9. l

OBJECTIVE 2

1. c
2. a
3. b
4. c

OBJECTIVE 3

Answers should include any five of the following or other construction careers presented in class

- Architects
- Assessors
- Backhoe operators
- Building materials manufacturing and sales
- Carpenters
- Commercial contractors
- Concrete contractors and stone masons
- Construction technology professors
- Electricians
- Environmental inspectors
- Inspectors for Farmer's Home Administration, Veteran's Administration, loan agencies, or government inspectors

- Metal building sales and erection personnel
- Plumbers
- Residential contractors
- Surveyors
- Welders

OBJECTIVE 4

1. M
2. M, C
3. C
4. M
5. C
6. M
7. W
8. M, C
9. W
10. M
11. C
12. C

OBJECTIVE 5

1. Float
2. Trowel
3. Shovel
4. Crosscut saw
5. Ripsaw
6. Straight claw hammer
7. Level
8. Brace
9. Bit
10. Tape measure
11. Chalkline
12. Framing square
13. Pipe wrench
14. Lock-grip pliers
15. Standard screwdriver
16. Phillips screwdriver
17. Adjustable wrench

OBJECTIVE 6

Answers should include the following:

- Computers are used in building design.
- Computers are used in processing building materials.
- Computers are used at the point of sale.

OBJECTIVE SHEET

AGRICULTURAL SALES AND SERVICE

XII

INTRODUCTION

What is the purpose of any career or job? What is the goal of any business? The answer is simple: to make money!

Since people won't just give money to you, you must have something to offer them. Business is simply the exchange of money for products or services. Choosing the best product or service, preparing it, making people aware of it, and making the exchange are the basic business steps. These basic steps are used in every business, from selling cattle or high-tech tractors to analyzing blood samples in a veterinary laboratory or running the local feed store.

Understanding these basic steps will help you enter the job market and handle your job responsibilities.

UNIT OBJECTIVE

After completing this unit, the student will be able to recognize responsibilities of business management, the scope of sales and international markets, and be able to complete basic business processes and calculations. The students will demonstrate these competencies by completing assignment sheets, job sheets, practical tests, and a written test with a minimum of 85% accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with agricultural sales and service to their definitions.
2. Match functional areas of an organization to their descriptions.
3. Select from a list true statements about international markets.
4. Choose the word or phrase that completes statements about customer relations.
5. List tasks involved in running a business.
6. Discuss entrepreneurship.
7. Select from a list true statements about advertising.
8. Calculate the cost of buying a truck. (Assignment Sheet 1)
9. Write a television commercial. (Assignment Sheet 2)

10. Write a newspaper advertisement. (Assignment Sheet 3)
11. Complete a business transaction. (Job Sheet 1)
12. Complete a class project in sales and service. (Job Sheet 2)
13. Prepare a poster. (Job Sheet 3)

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit. Speakers appropriate for this unit include commodities brokers, bankers, advertising representatives from local newspaper, television, or radio offices, and marketing personnel.
- Arrange to have all materials and supplies necessary to complete assignment sheets and job sheets.
- Collect samples of movie posters for students to evaluate. Local movie theaters and video rental stores may be a source for the posters.
- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with agricultural sales and service to their definitions.

- Add to this list any terms discussed in class or by guest speakers.
- Review Unit 2, Record Keeping.
- Use Extensions & Options 1 to illustrate objective information.

Objective 2: Match functional areas of an organization to their descriptions.

- Invite a local business representative to discuss sales and service and other areas in local business and how they are related.
- Discuss command hierarchies and have students diagram the chain of command in their school system, football team, or other organization.
- Have students list areas or projects related to two or more of the areas listed.
- Invite your school's applied economics instructor to discuss areas of sales and service.
- When Job Sheet 2 is assigned, divide students into sales or service areas. Have students determine the jobs assigned to each area. Have students discuss why jobs are distributed as they are and offer alternative organizations.

Objective 3: Select from a list true statements about international markets.

- Have students collect newspaper and magazine articles about international markets.
- Invite your school's history instructor to discuss the importance of international trade in history.
- Contact the office of your U.S. Senator or Representative. Invite a staff member to address your class on current trade issues. Request brochures or other materials.
- Discuss the concept of tariffs and embargoes. Explain the differences and similarities between the two.
- Discuss the differences between socialism, communism, and the free market systems. Explain that all are economic distinctions—not political. Have students identify programs in America today that are communistic, socialistic, and free-market.
- Use Supplements 1 and 2 to reinforce objective information.
- Use Transparency Masters 1 and 2 to illustrate objective information.

Objective 4: Choose the word or phrase that completes statements about customer relations.

- Have students keep a log of situations in which they are customers. Have them rank the business and each business representative they deal with in terms of knowledge, helpfulness, attitude, and overall satisfaction. Have them list why they were or were not satisfied with the treatment they received.

- Tell students they are customers of their school and have them list programs the school offers to improve customer relations.

- Have students role-play situations in which they, as consumers, must deal with company representatives who are polite, rude, well-trained, etc. Have students discuss how the impression of the company itself is enhanced or damaged by service.

- Have students relate customer treatment to customer appearance and attitude. Have them role-play settings in which the customer is belligerent, polite, etc., and see how their responses change.

- Invite a panel of front-line employees, such as cashiers at local fast-food restaurants, grocery stores, and discount stores. Have the panel discuss what they must face each day and how they handle those situations.

- Invite a representative of your local Chamber of Commerce to discuss customer satisfaction from an administrative point of view.

- Have students write a short report on what kind of customer service they would receive if they were king of the world.

- Have students complete Job Sheet 1.

Objective 5: List tasks involved in running a business.

Objective 6: Discuss entrepreneurship.

- Invite several small business owners to discuss their responsibilities and schedules. Ask them to begin by discussing what they thought owning a business would be like, then ask them to compare it to the actual experience.

- Have students collect articles about successful entrepreneurs.

- Have students list steps they think would be necessary to begin a small business. Have a local banker or business person review the plans and discuss beginning a small business with the class.

- Use Supplement 3 to reinforce objective information.

- Invite successful farmers or ranchers to discuss how they began their businesses.

- Invite a banker to discuss financing an agricultural enterprise and compare it to financing or managing a retail business.

- Contact your area vocational-technical school. Most offer assistance to small businesses and would be an excellent source of information and contacts.

- Have students complete Assignment Sheet 1.

- Have students complete Job Sheets 2 and 3.

Objective 7: Select from a list true statements about advertising.

- Have students collect examples of television, radio, magazine, and newspaper advertisements. Have them judge each according to the following: Do I like it? Does it make me want to buy the product? What methods are used to encourage me to buy the product?

- Have students list products they see being used in television shows and movies.

- Tell students that many commercials are now directed and produced by the same big-name professionals who direct and produce movies. Many of them believe a commercial is the ultimate challenge, because it allows only fifteen to sixty seconds in which to set a mood, make a point, then reinforce the point. Have students look for Hollywood influences in commercials.

- Have students identify other forms of advertising. Begin by asking them to simply list every piece of advertisement they see in the classroom. Be sure they include letter jackets, T-shirts, name tags on jeans, stickers on notebooks, donations to the classroom (if the company name is present), and the names of any clubs or organizations, such as the FFA, that are present.

- Have students complete Assignment Sheets 2 and 3.

803

APPLICATION

Objective 8: Calculate the cost of buying a truck.

- Invite the local tag agent or a local auto sales person to advise students.
- Ask a local bank or loan company to provide loan papers and have students complete the forms.
- Have students estimate costs over and above sticker price before beginning the exercise.
- Invite an insurance representative to discuss actuarials and insurance premiums and factors that affect them.

Objective 9: Write a television commercial.

- Invite your school's audiovisual person to help students film the commercials.
- Show the commercials in the school lunchroom or hallway before and after school.
- Have students identify each method used to sell the product.
- Divide students into groups and have each group use each of the following methods: endorsement by a celebrity, appeal to patriotism or school spirit, connecting the product to a setting or situation, telling selective truths.

Objective 10: Write a newspaper advertisement.

- Arrange for students to tour a local newspaper office and see how advertisements are constructed, or invite a salesperson to demonstrate the process.
- Have students survey newspaper advertisements and compare them to magazine advertisements.
- Have students review poster construction as presented in Job Sheet 3 and compare it to newspaper advertisement.
- Have students discuss the purpose of newspaper advertisements. Too much detailed information is inappropriate and can cause an ad to be ineffective; however, details such as sales price, model number, illustrations, etc. are very important.

Objective 11: Complete a business transaction.

- Review how students should and should not greet and address customers.
- Before asking students to complete the job sheet, show them how to use the cash register you have. Also show students how to calculate and add tax. If a cash register is unavailable, have them use an adding machine.
- Tell students that many fast-food businesses don't use cash registers any more. Instead, employees only have to push a button with the name of each product. The price is stored in the machine's memory.
- Discuss safety precautions that should be taken during a business transaction. Role-play a situation where a person leaves the cash drawer open, and is not careful and aware.
- Demonstrate how to make change. Many students today have never seen a cashier make change. Instead, many cashiers rely on register calculations and hand the customer the amount of change shown.
- Show students how to balance a register.

Objective 12: Complete a class project in sales and service.

- Job Sheet 2 can be used for door-to-door sales, service sales, or sales at a school event.
- Divide the class into areas of sales and service and assign or have students contract to complete specific job duties.
- Have the class plan, discuss, and approve all advertising. At least one advertisement should target a specific group, such as the faculty.
- Have the class prepare and adhere to a budget.
- If capital is not available, allow students to buy and sell stock.

Objective 13: Prepare a poster.

NOTE: This objective was recommended by students during prepublication research. The students wanted information that was practical and usable in this and other classes.

- Invite a local artist, graphic artist, or art instructor to discuss poster preparation.

- Explain to students that poster presentations may be required in many secondary classes.

- Have students compare movie posters to posters they have made in the past. Have them identify the center of interest, measure the margins, and count words (not including the small-print list of people involved in the production). Have them list things they know about the movie from the poster, such as what type of movie it is (comedy, action, sci-fi, etc.), who stars in it, and if it is geared toward children, teens, or adults, etc.

EVALUATION

Pretest

- Give written test as pretest.

- Determine individual study requirements.

- Counsel students individually on pretest results and study requirements.

- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.

- Describe the rating scale used on the practical test.

- Give practical test.

- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.

- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Cooperatives--Working For All of Us.* American Institute of Cooperation, 50 F Street NW, Suite 900, Washington, D. C. 20001. Describes cooperatives, cooperative methods, and the importance of cooperatives to America. (11 minutes, color, VHS)

- Oklahoma Department of Vocational and Technical Education, Resource Center, Attn: Instructional Media Specialist, 1500 West Seventh Avenue, Stillwater, OK 74074. The following films are available on a free-loan basis to Oklahoma teachers.

  Customer Service: The Film. Uses humor to illustrate good and bad customer practices and their results. (25 minutes, color, VHS)

  How to Deal with All Kinds of Customers. Demonstrates how to handle a variety of customers and situations. (30 minutes, color, VHS)

  Managing Your Money. Follows Carol as she receives her first paycheck, discovers how taxes affect income, and yields to temptation before she learns the importance of budgeting money. (23 minutes, color, VHS)

  The Open for Business Series. Programs 1 and 2 include interviews with entrepreneurs who discuss the advantages and disadvantages of being self-employed, the source of their ideas, and assessing potential successes of new ideas. Programs 3 and 4 include a discussion of marketing and its relation to sales, determining capital needs, and start-up costs. Programs 5 and 6 include the importance of financial management and record keeping, types of record keeping, and the responsibilities associated with management. (60 minutes, color, VHS)

  Well, Excuse Me! A humorous look at poor business manners and inappropriate business behavior. (20 minutes, color, VHS)

- *Who Gets Your Food Dollar?* Wisconsin Farm Bureau Federation, 7010 Mineral Point Road, Box 55550, Madison, WI 53705. Explains how the food dollar is divided along the farmer-to-customer route. (Slide set with script and brochure)

Print Media

- *Cooperatives in Agribusiness.* Agricultural Cooperative Service, USDA, P. O. Box 96576, Washington, DC, 1989.
- *Farmers and Ranchers: Guide to Commercial Credit.* American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605, 800-228-4689.
- *The Marketplace Program.* Chicago Board of Trade, Literature Services Staff, 141 West Jackson Boulevard, Chicago, IL 60604. Includes student book, teacher's guide, and tests.

Software

- *G. E. B.*, 7166 N. Fruit #126, Fresno, CA 93711, 209-439-9465. Offers the following software:

  Agricultural Assortment. Includes a wide range of farm management programs compiled by the University of Minnesota, Department of Agriculture. Includes yield analysis, harvest, gestation dates, feed requirements, bid price, etc. For use with CBA or BASIC. Order number 1834.

  Agriculture Programs from Ridgetown College. Includes various programs compiled by Ridgetown College, Ontario, Canada. Includes metric conversion, wood heat calculator, soil loss evaluation, and computer carpentry. Order number 1835.

- *American Association for Vocational Instructional Materials*, 745 Gaines School Road, Athens, GA 30605, 800-228-4689. Offers the following software:

  Agricultural Financial Calculations. Analyzes a variety of money matters, including simple interest loans, depreciation, mortgage analysis, leasing vs. purchasing, and compound interest. For use on Apple and IBM systems.

  Agri-Data Base. Can be used to create mailing lists, inventories, equipment files, and student records. For use on Apple computers.

  Agri-Selling. Covers all areas of selling, including prospecting, presentation, closing, and handling customer attitudes. For use on Apple or IBM systems.

  Commodity Marketing. For use for the FFA Commodity Marketing Contest. Updated yearly. For use on Apple or IBM systems.

Farm Business Management Quiz. Designed for review and self-study for the National Farm Business Management contest or FFA State Farmer Degree interviews. For use on Apple systems.

Farm and Ranch Business Management and Related Review I and II. Includes true/false, multiple choice, and problem questions, which can be used for student review and test preparation. Designed to be used in conjunction with John Deere's Farm and Ranch Business Management Manual. Section I includes information on record keeping, financial analysis, budget analysis, cost analysis, and cash flow analysis. Section II includes information on marketing, investment analysis, taxes, business organization, ag law, and computer applications. For use on Apple II, IBM-PC, or Macintosh systems.

Marketing and Options and Related Review. Includes student review and test preparation options. For use on Apple II, IBM-PC, or Macintosh systems.

Micro-Tutor Series, Version 4.0, Farm Finance and *Farm Management.* Includes quizzes to be used for instruction and review. *Farm Finance* includes information about financial statements, budgeting, planning, and credit investment. *Farm Management* includes information about recordkeeping, budgeting, and credit. For use on Apple and IBM systems.

Trade Simulator. Teaches principles of international trade in a computer game. Provides definitions and instructional information, a detailed profit and loss statement after each play, two levels of play, and suggestions for improved strategy. Includes student text and instructor's guide. For use on Apple IIe, Apple IIc, or IBM-PC systems.

Trade Simulator Exam Maker. Can be used in conjunction with Trade Simulator (above) to monitor student process and class contests. For use on Apple IIe, Apple IIc, or IBM-PC systems.

UNIT REFERENCES

- *Applied Economics.* Junior Achievement: Colorado Springs, 1990.
- Charlet, Barbara and Shida Rastegari Henneberry. *International Marketing of Fresh and Processed Fruits and Vegetables: An Oklahoma Challenge.* Oklahoma State University, Cooperative Extension Service: Stillwater, OK.
- "Deals on Wheels," *Tulsa World.* November 25, 1990.
- Henneberry, David, Professor of Agricultural Economics, Oklahoma State University. Interview, March 1992.

- *The Kiplinger Agriculture Letter*, Volume 62, No. 7: Washington, DC, April 5, 1991.
- "Mail-Order Food Market Revs Up For Holidays Season," *Tulsa World*, November 25, 1990.
- *A Profile of Food Consumption Trends and Changing Market Institutions*. Oklahoma State University Cooperative Extension Service.

PRINCIPAL AND INTEREST

Interest is the money you pay to borrow money or charge a purchase. The larger the amount you borrow or charge, the more you pay in interest. And, of course, the higher the interest rate, the more you pay in interest. The longer you take to repay the loan or balance, the greater the amount you must repay. Consider five repayment schedules for a loan of $1000.00 at 10% interest:

Term of Loan	Principal	Monthly Payment	Total Interest Paid	Total of all payments
1 year	$ 1000	$ 87.92	$ 55.04	$ 1055.04
2 years	$ 1000	$ 46.15	$ 107.60	$ 1107.60
3 years	$ 1000	$ 32.27	$ 161.72	$ 1161.72
4 years	$ 1000	$ 25.37	$ 217.76	$ 1217.76
5 years	$ 1000	$ 21.25	$ 275.00	$ 1275.00

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OBJECTIVE 1

Match terms associated with agricultural sales and service to their definitions.

- **capital** – the money, tools, and other items necessary to produce a product or deliver a service

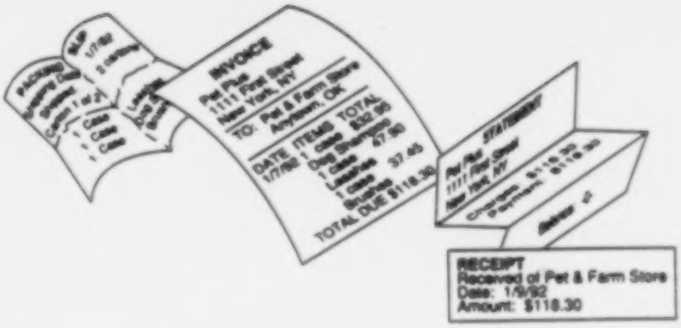
  EXAMPLES: tractors, land, factories, money

- **economics** – the distribution and use of money

  NOTE: Economics is based on the principle of *scarcity*, that is the idea that no one person can have everything. As a result, everything (wealth) is shared (distribution).

- **entrepreneur** – a person who forms a business, assumes the risk involved, and earns any profit produced
- **expenses** – charges or costs
- **exports** – products sent to other countries
- **imports** – products brought from other countries
- **interest** – money charged, usually as a percentage, for borrowing money or charging purchases
- **invoice** – a list of products, services, and fees presented as a request for payment

  NOTE: Invoices are itemized and show details of the transaction, such as the number of hours worked, the number of items purchased, etc. A bill, on the other hand, may show only the balance due. The first bill presented is an invoice. Later bills are called statements. Another related document is a bill of lading which lists items shipped, but not a balance due.


PACKING SLIP
INVOICE
Pet Plus
1111 First Street
New York, NY
TO: Pet & Farm Store
Anytown, OK
DATE ITEMS TOTAL
1/7/92 1 Case $32.90
Dog Shampoo
1 Case 47.90
Leashes
1 Case 37.45
Brushes
TOTAL DUE $118.30
STATEMENT
Pet Plus
1111 First Street
New York, NY
Charges $118.30
Payment $118.30
Balance 0
RECEIPT
Received of Pet & Farm Store
Date: 1/9/92
Amount: $118.30

- **receipt** – a document proving payment
- **service** – labor, knowledge, or assistance offered and sold as a product

  EXAMPLES: Mowing lawns, babysitting, plumbing, painting, harvesting, medical treatment, etc.
- **tax** – a fee charged to citizens or added to purchases to finance government programs

OBJECTIVE 2 **Match functional areas of an organization to their descriptions.**

- **accounting** – records, classifies, and summarizes financial transactions

  NOTE: Accounting can include many sub-departments such as bookkeeping and inventory control.
- **administration** – manages the day-to-day and long term business operations such as hiring employees, coordinating divisions, and supervising operations
- **advertising** – informs the public about the product or service and encourages them to buy it
- **customer service** – meets after-purchase customer needs

  NOTE: Customer service can include such things as 800 telephone numbers, replacement parts, and repair service.

- **marketing** – studies the population, their habits, and sales records to advise the company on advertising, new products, etc.

> Marketing uses *statistics*, a method of applying mathematics to measure opinions and predict trends. Statisticians measure a small group, called a sampling. They can identify characteristics of the target-group members, then calculate how often those characteristics occur in the general public. Statisticians probably know more about you than you know about yourself. For example, what is your favorite sleeping position (76 percent probability of your side), how many unmatched socks are in your drawers (70 percent probability of none), do you put on your shoes and socks sock-sock-shoe-shoe or sock-shoe-sock-shoe (81 percent probability of sock-sock-shoe-shoe), do you put your paper money in your wallet in order by denomination or randomly (74 percent probability of order by denomination) and do you lick the envelopes from left-to-right or right-to-left (68 percent probability of left-to-right).

- **production** – the actual manufacturing of the product
- **research and development** – studies a product's uses, designs improvements, and new products

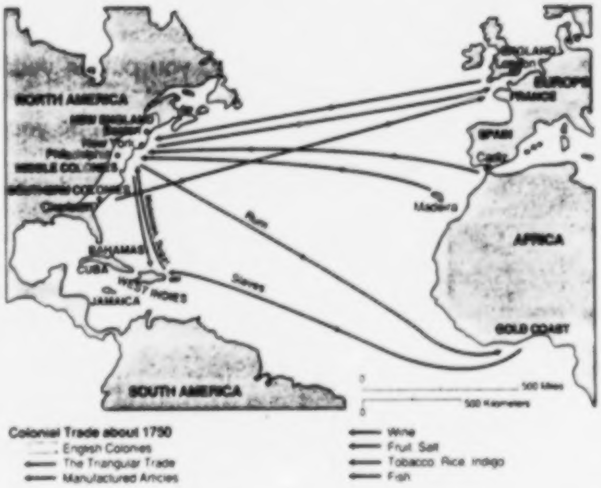
OBJECTIVE 3 **Select from a list true statements about international markets.**

International trade, buying products from other countries and selling products to other countries, is an important part of the economy. A nation can use its natural resources to make a profit, while sharing those resources with the rest of the world.

International trade has been one of the world's greatest influences. It has led to exploration and colonization. Columbus visited North America as he searched for trade routes between Europe and Asia.

After the Colonies were settled, they were part of an intricate trade agreement among Europe, North America, the West Indies, and Africa.

(art work 3.5")


NORTH AMERICA
NEW ENGLAND
Boston
New York
Philadelphia
MIDDLE COLONIES
SOUTHERN COLONIES
Charleston
BAHAMAS
CUBA
WEST INDIES
JAMAICA
SOUTH AMERICA
ENGLAND
London
EUROPE
FRANCE
SPAIN
Cadiz
Madeira
AFRICA
GOLD COAST
Rum
Slaves
0
500 Miles
500 Kilometers
0
Colonial Trade about 1750
English Colonies
The Triangular Trade
Manufactured Articles
Wine
Fruit Salt
Tobacco Rice Indigo
Fish

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Later, debate about how trade between the United States and other countries contributed to (many experts say actually caused) the Civil War. Before entering World War II, America used international trade to support European allies and combat the growth of Germany. Trade control has been used to change relations with many nations, including the former Soviet Union, China, Korea, Colombia, Iran, Iraq, and Japan.

The United States exports animal feeds, cotton, hides and skins, tobacco, grains, horticultural products, corn, wheat, soybeans, and meat to other countries. We buy animals, coffee, grain, fruits, nuts, cocoa, meat, and vegetables from other countries. We export more agriculture products than we import. In fact, we produce more than half the world's grain.

Most of the wheat we export goes to very poor countries. These nations need to import the wheat to feed their people, but because the nations are poor, paying for the wheat can be difficult. Sometimes our government gives these nations money to buy wheat from us. As the nations grow, they continue to buy our wheat. Today, eight of America's top ten wheat customers first bought American wheat with foreign aid money.

To help their economies grow, these nations also use American foreign aid money to build industries. The first industry they try to develop is agriculture. It is very common for them to import wheat and, at the same time, use American technology to learn to grow wheat themselves. Occasionally they are even able to export some wheat. However, it is less expensive for them to continue to import wheat and instead begin to grow industrially. No nation has used our assistance to become a serious wheat competitor.

International markets affect prices. If another country begins producing wheat, for example, the U.S. wheat price will fall. If wheat crops in other countries are reduced because of bad weather, the price of U.S. wheat will increase.

Sometimes countries try to protect their industries by imposing tariffs or embargoes. A tariff is a tax on imported goods. An embargo prevents importing specific goods. For example, if France began producing 8th grade agricultural education textbooks and selling them in America for less than our books, our government might impose a tariff. The tariff would raise the price of the French book, making schools more likely to buy the American book. If the tariff didn't slow the number of French textbooks entering the country, an embargo could be imposed, and no French textbooks could be imported at all.

In the 1960's many nations began to cooperate on reducing tariffs and encouraging international trade. These negotiations were called the GATT talks for General Agreement on Tariffs and Trades. When President Kennedy called the 1960's round of GATT talks into session, he told all nations that they should be willing to cut tariffs in half if they wanted to participate. More than 80 percent of all nations did attend and tariffs were cut by more than one-third. However, agricultural agreements could not be made, and agriculture was removed from those GATT talks.

In every round since, nations have been unable to come to agreements on agricultural tariffs. In 1986, the Uruguay Round began. This round was to discuss only agricultural tariffs. By 1992, no agreement had been reached.

WHY IS AGRICULTURE DIFFERENT?

Why can nations agree on tariffs for computers, medicine, clothing, and cars, but not agricultural products? There are many reasons. The primary one is that every nation has an agriculture industry. No nation on earth is without one.

In addition, food is important for survival. Nations that have gone through famines are usually unwilling to rely on a future without a strong agriculture industry in their country. For example, during World War II, many Europeans had money and homes, even during the worst part of the war. Yet, many of them starved because they could not get food into their country. Today European Community nations protect their farming industry. America has never suffered a famine, and many citizens don't understand why these nations will not just buy our food.

Another difference between our nation and other countries is our policy of redistricting. Every ten years, our nation conducts a census, a count of all citizens. After the census, district lines are redrawn to compensate for population shifts. For example, as Americans moved from farms to cities, rural districts became larger (fewer citizens=fewer representatives) and urban districts became smaller (more citizens=more representatives). In other countries, such as Japan, this never takes place. As Japanese citizens moved from the farms to the cities, the few rural citizens began to have more power over the Japanese government. Strong tariffs and subsidies resulted.

Even with tariffs, the market system spurs agricultural growth and trade. For example, America does not produce enough beef to meet our demands. To meet the demand, we import beef. One of our biggest suppliers is Argentina, which sends us canned, "industrial" meat. The beef you eat in your school lunch is probably from Argentina. At the same time, America exports expensive cuts of beef to Japan, where it sells for more than $50 per pound, including fees and tariffs.

Embargoes are not foolproof. Some people doubt they even work at all. For example, if we really did embargo French textbooks, the French could sell the textbooks to Canada, who could then sell them to us. This has been done may times, including during the 1991 Iraqi embargo and the 1980 Soviet wheat embargo.

OBJECTIVE 4

Choose the word or phrase that completes statements about customer relations.

No business, no matter how well organized, can make money if customers are not happy. Products must meet customer needs of convenience and reliability. In addition, the customer must be treated courteously. "The customer is always right" is not just an old line—it's good business. Customers who are treated well come back, but customers who are treated badly will go elsewhere.

Businesses offer many services in the name of customer service. Special savings cards and clubs, carrying bags to the car, home deliveries, accepting credit cards, personalizing merchandise, and free coffee or samples are all part of customer service. In addition, most businesses train employees in proper treatment of customers.

You may think there is no link between say, raising mushrooms and customer relations. However, many agricultural entrepreneurs have combined consumers' desire for convenience, marketing information, and today's overnight shipping industry to build a growing mail-order food industry. Today consumers can order fruit, quail, clams wrapped in seaweed and ready for steaming, cheese, exotic mushrooms, asparagus, purple potatoes, elephant garlic, herbs and spices, and even ice cream delivered right to their door—or to someone else's door as a gift. In 1990, $1.2 billion was made in mail-order food.

Many businesses hire young people to deal directly with customers. Stores hire young people as stockers, baggers, and cashiers. Restaurants hire young people to wait on or clear tables and to take orders. Landscaping companies hire young people to mow lawns, trim hedges, etc.

Good employees understand the importance of customer relations. They are neat and clean, say "please" and "thank you," and deal with customers promptly. Customer relations are also improved when employees are prepared and knowledgeable. Have you ever been angry or frustrated by an employee who didn't have what you wanted or didn't know what to do? Most importantly, though, a good employee smiles at customers and makes them comfortable.

When American businesses began operating in the former Soviet Union, they discovered that workers in the non-competitive business world there had never been introduced to customer relations. Employees at American hotels in Russian cities went to special classes designed to teach them to say hello and make pleasant conversation, to address customers politely, even how and when to smile!

OBJECTIVE 5

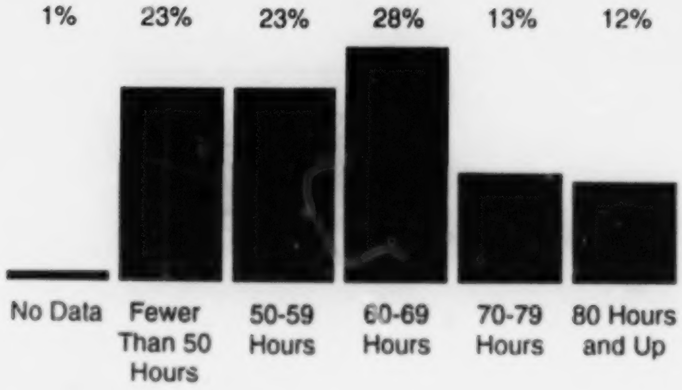
List tasks involved in running a business.

To many people, owning their own business sounds like a wonderful life. There would be no schedules to keep, no boss to answer to, nobody to please but yourself. Wonderful life, right?

But things don't always work out that way. Running a business—any business—is a full-time job. Just think about all these responsibilities. A business person has to:

- Produce the product on schedule
- Fill and ship or deliver all orders
- Keep all tools and machinery in good operating condition
- Pay all bills and taxes on time
- Research and design new products
- Watch the markets and identify trends affecting the business
- Network with other people in similar businesses
- Hire and train employees
- Maintain a cash-flow that allows you to pay bills and salaries
- Supervise advertising and promotional events
- Make sure quality and customer satisfaction remain high
- Interpret marketing information
- Learn about new technology that affects your business and product
- Maintain certifications and licenses

HOURS PER WEEK WORKED BY NEW BUSINESS OWNERS



OBJECTIVE 6

Discuss entrepreneurship.

Even with all the work involved, millions of Americans choose to start their own business. Large companies can raise money by selling stock, but entrepreneurs accept the risk of beginning a business without that help. Most small business owners invest their own savings or borrow money. If the business fails, they lose their money.

On the other hand, if the business succeeds, they get the rewards. Some of the world's largest businesses began as small entrepreneurships. For example, Ford, IBM, and John Deere were all small businesses at one time.

> When Steven Jobs decided to make a low-cost personal computer, he sold his second-hand Volkswagen van to raise the capital he needed. The result was his company, Apple. Within a few years, he was a multi-millionaire.

Small business is important to America. More than 80 percent of all jobs are in companies with fewer than 100 employees. More than one million new businesses are started each year, most of them by entrepreneurs who invest their life's savings in their new enterprises. Small businesses provide the marketplace with new products and processes. They also give stability to our economy. Changes that affect large businesses may not affect small businesses. In some cases, small businesses can profit from changes in big business.

OBJECTIVE 7 **Select from a list true statements about advertising.**

Many experts say advertising is the strongest force in America today. Advertising helps shape how we spend our money, how we dress, how we spend our time, what we eat, and what we want to look like.

Businesses use advertising to encourage us to buy their products. Television, radio, and newspaper advertisements are the most apparent, but there are many other types of advertising. Businesses sponsor athletic teams, distribute ink pens, mail flyers, and sponsor contests or other events.

Some advertising is basically education. It simply gives information about the product or service. However advertisers can use other methods to encourage people to buy their products.

Sometimes celebrities endorse a product. Movie stars and athletes make commercials or put their name and picture on the product. Another form of celebrity endorsement is to include the product in a motion picture. During the movie, one of the characters might use the product or might just be pictured with it.

One method advertisers use is to present a scene people will find attractive, as though using the product will make the consumer part of the scene. For example, car manufacturers show their cars in beautiful settings, driven by attractive, successful people, and admired by beautiful women. Fast food restaurants show happy young people laughing and having fun.

TARGETING CONSUMERS

Marketing and advertising go hand-in-hand. Advertisers use market research to design commercials that target specific groups. For example, one food chain airs commercials showing young people during programs young people watch, commercials showing older customers and personnel during programs older people watch, commercials in Spanish on Spanish channels, and commercials showing families during family programming.

As the population changes, advertisements change. In the future, you will see more commercials featuring older people. These commercials will portray older people as healthy and active. Why? Because the number of older Americans is increasing.

There are Federal laws against deceptive advertising. The Federal Trade Commission monitors advertising and may ask for proof of claims. The FTC can order false or misleading advertising to be withdrawn and has the authority to fine companies that break the law.

Although these "truth in advertising" laws exist, some advertisements only present part of the truth or portray it in a biased manner.

Finally, advertisers use certain words or phrases they know you are looking for, such as "free," "discount," "low-interest," or "improved."

OSU CENTER FOR INTERNATIONAL TRADE AND DEVELOPMENT

The Center for International Trade and Development (CITD) at Oklahoma State University in Stillwater was formed to help businesses find and develop markets worldwide. The center assists small and medium size companies in finding ways to export their products or increase their exporting programs.

While many companies are highly successful in the domestic market, finding and taking advantage of opportunities in foreign markets can be difficult.

Besides language barriers, companies often find that cultural differences can also become obstacles. CITD offers training in both of these areas.

CITD helps companies find and use information about market trends, sources of financing, and technical information.

Many companies in Oklahoma have used CITD to expand their markets into other countries. To be a successful business person or entrepreneur, it is important to know your product or service well. It is also important to know how and when to seek expertise that may be yours for the asking and as close as your own town.

THE FREE MARKET AND FOREIGN INVESTORS

America practices a free enterprise, or free market system. As you've discussed in history and civics classes, this means our economy is based on supply and demand. If a product is easily available, it is low-cost; if a product is rarer, it is also more valued and the price goes up.

People with money to invest can use the free market system. They can buy products or shares of stock that are low-priced right now, but will probably become more valuable in the future. When the product's or stock's value increases, the investor can sell. The difference in what was paid for the product or stocks and what it was sold for is profit.

America's system also allows people from other nations to invest in our markets. For example, if you lived in Europe and saw that people in your country would be importing more American rice in the next few years, you might buy stock in an American rice company. Your investment would give operating capital to the grower, increasing his or her ability to produce a good crop. The crop could be sold in your country, raising the value of the stock, and giving you a good profit.

Some people are worried about the number of foreign investors, especially in the area of land ownership. They worry that too much profit is going to other countries and that businesses will rely on foreign investors too much. It's important to remember that Americans also invest in other countries. We invest in their stock markets, sell our goods abroad, and build our businesses in their countries.

ARE YOU AN ENTREPRENEUR?

by Victor Kiam

When I was eight, the streetcar named Desire ran only four blocks from my home in New Orleans. But the sound of eager Desire racing through the night did not inspire me–as it did Tennessee Williams–to spin a passionate tale. Instead, it invited the entrepreneurial muse to whisper the suggestions that guided me to the path I'm still traveling.

That summer I noticed that people getting off the streetcar at the end of the day looked as if they would pass out if they had to take another step without a cool drink. I didn't realize it then, but I had responded to the first precept of an entrepreneur: I had recognized a need.

My grandfather staked me to five dollars to buy 100 bottles of Coke. But before I could take my first step into the world of high finance, I had to set a price for my goods. With naive boldness, I settled on a markup of 100 percent!

Business was brisk the first day and got better as the week progressed. You would have thought I was a pint-size John D. Rockefeller. My grandfather was of that opinion. So you can imagine his shock when, having sold my entire stock, I had only four dollars to show for my efforts.

Few of my customers could afford to pay ten cents for a bottle of soda. Many couldn't even afford the nickel I needed to break even. It was so hot that I couldn't bear to let anyone go away empty-handed, so I trampled my bottom line by giving away my merchandise. My first business was a financial failure, but it sure built up a lot of good will.

Entrepreneurs can be found everywhere–from fellows with outdoor lunch wagons to people within the corporate mainstream. Their common bond is that they are risk takers, willing to roll the dice with their money or put their reputations on the line in support of an idea or a project. They're following their *own* visions, and have decided to make the sacrifices necessary to achieve success.

In 1968, after 18 years at Lever Brothers and Playtex, I left my job. I had long thought of doing something on my own, but it was talking with friends and attending a seminar on entrepreneurship that gave me the push I needed. I bought into the Benrus Corporation. Then in 1979, I acquired the Remington Company.

Thirty-five years of experience have given me a good idea of the entrepreneur's profile. To find out if you have the right stuff, ask yourself:

1. *Do I have enough self-confidence?* Before the start of the 1985 baseball season, Pete Rose was asked how many times at bat it would take to get the 95 hits he needed to break Ty Cobb's record. Rose responded, "Ninety-five. I expect to get a hit every time up."

   You must believe in yourself. In a corporation, you want the people working under you to follow your lead; you want your superiors to respect your judgement. If you're running your own business, you want investors to place their money and trust behind you. You want your clients to catch your enthusiasm and to believe in your product or service. How can you inspire them if you don't believe in yourself?

   If you lack self-confidence, find some. Lack of confidence isn't a disease, it's a symptom. Self-perceived negatives can rob you of a healthy ego.

   Every six months, to deal with mine, I do a personal balance sheet. I make a list of my pluses and my minuses. For example, I was once a procrastinator. Confronting this in black and white helped me to overcome it. I started making it a point to tackle distasteful jobs first. In a short time, procrastination disappeared from my list of minuses.

   Facing my negatives, I developed a more positive sense of myself. There is nothing on my list I can't overcome if I make the effort. Try a balance sheet of your own.

2. *Do I have confidence in my venture?* I've been asked, "When you make an investment, are you backing the idea or the people behind it?" Both. No entrepreneur is a miracle worker. You can labor 16 hours a day, seven days a week, but if your product is lousy, you've wasted your time.

   A friend of mine is a terrific shoe salesman. When management of the business changed, the quality of the stock dropped off. A customer complained that the expensive shoe she was about to buy was too snug. He offered to stretch it. "I gripped the shoe and pulled," he told me. "It tore in half. What had been a finely crafted shoe was now a piece of junk. I told the customer the truth, then I resigned."

   The lesson is simple: You can't sell anything you wouldn't buy.

3. *Am I willing to make sacrifices?* Body builders have a saying, "No pain, no gain." It should be the credo of every entrepreneur. Forget the clock. Nine-to-five doesn't exist.

   Saturday became part of my regular work schedule as a young salesman. And when a snowstorm hit my region, it was an opportunity, not an obstacle. The idea that my rivals would be hiding from the elements gave me the impetus to push my product. It's amazing how receptive a buyer could be when the snow was waist-deep and I was the only friendly face he'd seen all day.

   If you're opening your own business, you'll lose the security of a paycheck and the company benefits you take for granted. And there will be other changes in your lifestyle. You might not get home for dinner; relaxing weekends may be few and far between. I've even seen entrepreneurs whose marriages fell apart because they forgot about their spouses. That's one sacrifice I don't recommend!

4. *Do I recognize opportunity?* This is key. Get used to examining all angles of a proposition. Ask, "How can this work for me?"

   I learned this the hard way. When I was with Playtex I met an inventor who showed me two pieces of nylon fabric and demonstrated how they adhered without hooks, zippers, or snaps. All I could think about was the lack of applicability for our brassiere business.

   That product was Velcro. And not a day goes by when I don't see it used somewhere.

5. *Am I decisive?* You'd better be. As an entrepreneur, you're on your own. And you're going to encounter situations where time isn't on your side. At Lever Brothers we were launching a new product, an improved wrinkle cream. We planned a major promotion in Ohio stores, with a famous makeup man flying in from New York to apply the gook, but he suddenly became ill and couldn't come.

   What do I do now? I thought. So I spent the next 24 hours in a crash course in makeup, using a secretary as a guinea pig. Poor woman. I practiced until her face was raw.

   My moment of truth came with my first customer, the wife of a store president. I applied the product and she left without comment. Two days later she came back. Her husband had liked the results so much that she wanted more. Developing a quick, positive response to adversity had saved an important promotional campaign.

6. *Am I willing to lead by example?* You can't ask your troops to give their all if your idea of a rough day is two hours in the office and six on the golf course. I never ask an employee to do something I'm not willing to do, and I work even harder than they do.

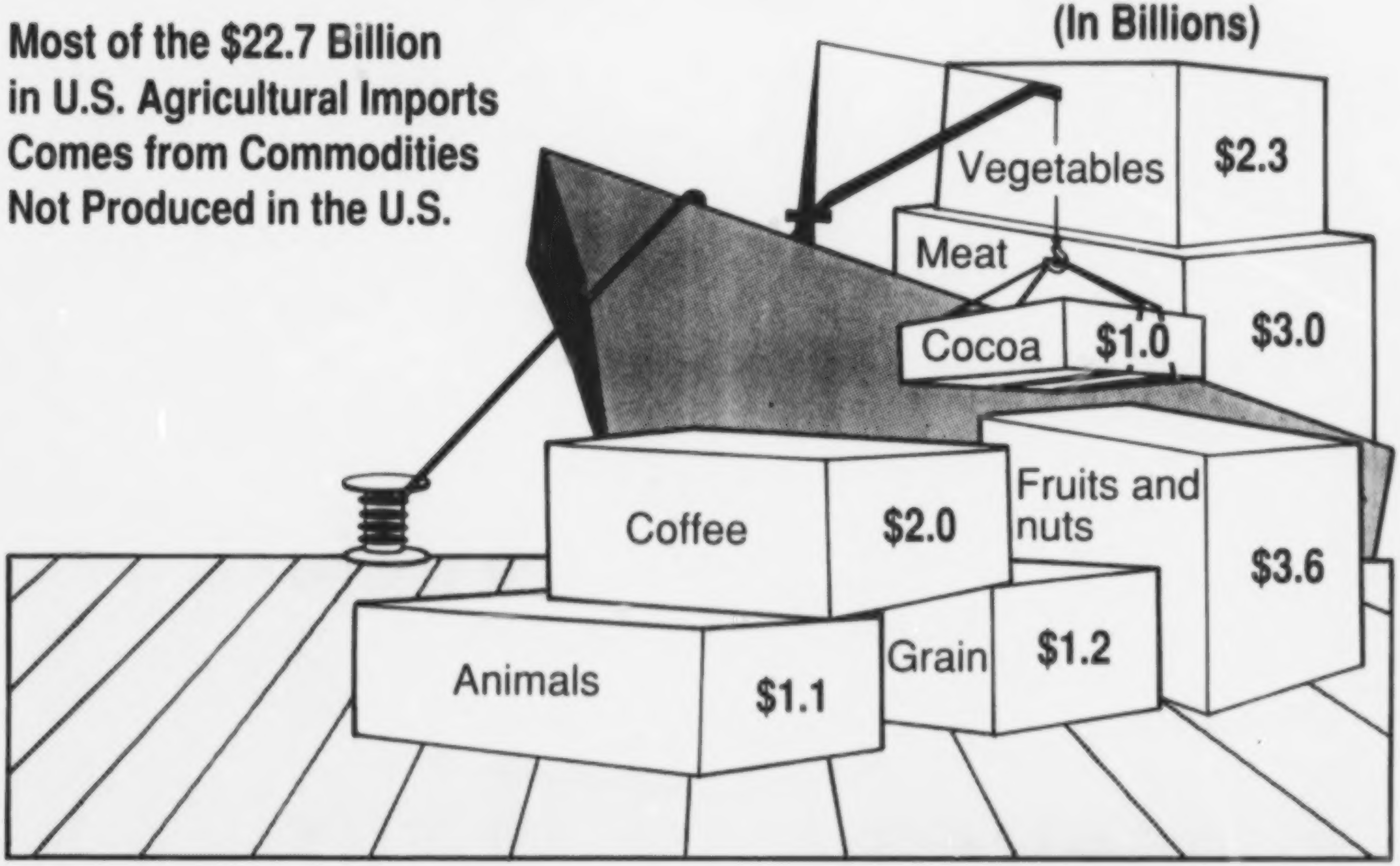
By now you should have some idea if you have what it takes to be an entrepreneur. So I'll mention some of the rewards for your sacrifices. You'll find satisfaction in creating something out of nothing. You'll gain a positive sense of self. And of course, there are financial rewards.

But it's not easy. Nothing worthwhile is. If David had slain a dwarf instead of a giant, who would have remembered?

This is a reprint of an article which originally appeared in the April 1986 edition of *Reader's Digest*. Used with permission of Victor Kiam, author.

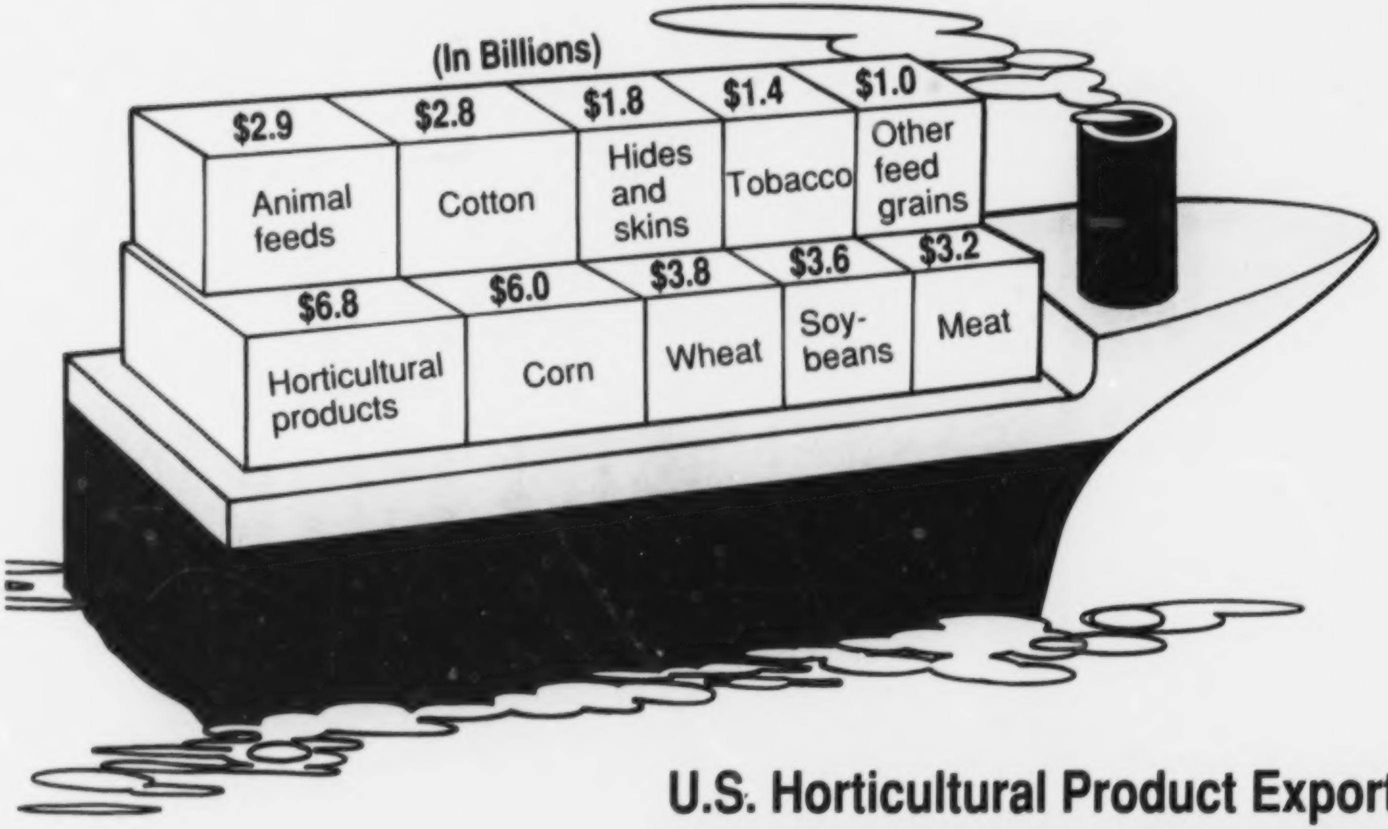
Agricultural Products We Buy Abroad

Most of the $22.7 Billion in U.S. Agricultural Imports Comes from Commodities Not Produced in the U.S.



Adapted with permission of American Farm Bureau Federation.

Top U.S. Farm Exports



U.S. Horticultural Product Exports Increased by Nearly 30% in 1990.

Adapted with permission of American Farm Bureau Federation.

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
MATHEMATICS SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, oral communication, interpersonal or relating, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Gaining factual information
- Using magazines and newspapers

MATHEMATICS SKILLS

- Calculating with whole numbers
- Collecting/recording data
- Solving income/expense problems

ORAL COMMUNICATION SKILLS

- Applying questioning techniques
- Working effectively in a group
- Communicating with professional colleagues/associates

INTERPERSONAL OR RELATING SKILLS

- Interacting with professional colleagues/associates
- Participating in group activities

EMPLOYABILITY SKILLS

- Mastering a specific job task/procedure

- If students have difficulty gaining factual information:
  - Suggest they make a list of needed information before they begin reading.
  - Read carefully, noting key words and phrases.
- If students have difficulty using magazines and newspapers:
  - Examine the structure of the magazine or newspaper.
  - Discuss the goals and perspectives of various magazines and newspapers.
- If students have difficulty calculating with whole numbers, review basic addition, subtraction, multiplication and division skills.
- If students have difficulty collecting/recording data:
  - Remind them of the importance of recording data precisely.
  - Suggest several sources of information.
- If students have difficulty solving expense/income problems:
  - Define the terms "expense" and "income."
  - Review basic math skills.
- If students have difficulty applying questioning techniques:
  - Instruct them to be prepared and have their questions organized before the interview begins.
  - Stress the importance of accurate questioning to obtain needed information.
- If students have difficulty working effectively in a group:
  - Discuss the goals and tasks the group needs to accomplish.
  - Discuss which task each student is to work on.
  - Suggest they delegate responsibilities.
  - Review communication skills.

- If students have difficulty communicating or interacting with professional colleagues/associates:
  - Remind them that professionals are excellent resources.
  - Discuss the fact that approaching professionals may make them nervous but is a skill they will be able to use in many areas of life.
  - Review communication skills.
- If students have difficulty mastering a specific job task/procedure:
  - Suggest they study each component of the task to determine which area is causing difficulty.
  - Review and practice skills for that area.
  - Review the entire procedure.
  - Team them with a proficient student or professional to practice the task.

ASSIGNMENT SHEET 1

AGRICULTURAL SALES AND SERVICE

XII

Name ______________________ Score __________

OBJECTIVE 8 **Calculate the cost of buying a truck.**

INTRODUCTION

One of the most frequent reasons for business failure is a lack of planning and a lack of understanding the complete cost of operation. No piece of machinery is cost-free just because it is purchased. For example, a copier may cost $2,500, but to use it you still have to buy paper, ink, electricity, and pay for service/maintenance. In the same way, if you buy a tractor, you still have to buy fuel, pay for repairs, pay insurance premiums, taxes, etc. These costs can be surprisingly high. Even if you never go into business, you will face this problem. In this assignment, you will discover just what it really costs to buy a truck.

DIRECTIONS

1. Your instructor will divide you into teams of four students and give each team a current newspaper.
2. Look through the newspaper and select a truck, new or used, to "buy."

   What kind of truck is it? ______________________

   What year is it? ______________________

   What does it cost? ______________________

3. Each member of the team is to choose one of the following, contact the person chosen, and bring the information to your next class:

   - Contact your local tag agency for cost of excise tax, title transfer, and any other fees required when a new truck is purchased.

     NOTE: You will need to know the year, make, and model of the truck before you contact the tag agency. You will also need to estimate the factory price and total delivered price of the truck.

     Excise tax ______________________

     Title transfer ______________________

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Use magazines and newspapers

Operation and Calculation Skills
- Calculate with whole numbers

Data Analysis and Display Skills
- Collect/record data

Functional Math Skills
- Solve income/expense problems

Interactive Communication Skills
- Apply questioning techniques
- Work effectively in a group
- Communicate with professional colleagues/ associates

General Relating Skills
- Interact with professional colleagues/ associates
- Participate in group activities

Job Acquisition/ Development Skills
- Master specific job task/procedure

Other fees ______________________________

- Contact a bank loan officer and ask about the interest rate and the total interest due on a 5-year loan.

NOTE: Do not try to determine the interest by just multiplying the purchase price by the interest rate. Interest on a bank loan is calculated differently.

Interest rate ______________________________

Total interest paid ______________________________

Total paid (principal plus interest) ____________________

- Contact an insurance representative and ask about insurance payments for a 16-year-old who has successfully completed Driver's Education.

Insurance costs ______________________________

- Contact a garage or dealership and ask what an annual inspection sticker costs and what mileage you might expect to get from the truck.

Inspection sticker ______________________________

Assume you drive 100 miles per week and gasoline averages $1.00 per gallon. What would your annual gasoline bill be?

____

4. Total all costs and determine what buying the truck would really cost.

True cost of truck ______________________________

NOTE: Understand that even this figure is not accurate. Oil, filters, tires, and other maintenance costs are not included. The cost of a driver's license is not included. The cost of any accidents or tickets is not included. Traveling 100 miles per week could be very low, and paying $1.00 per gallon for gasoline is also low.

ASSIGNMENT SHEET 2

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, oral communication, creative thinking/problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Following written instructions

WRITING SKILLS

- Stating ideas clearly

ORAL COMMUNICATION SKILLS

- Making informative presentations
- Making persuasive presentations
- Selecting words effectively
- Adapting presentation to specific audience

CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Identifying critical elements/issues
- Identifying/developing alternatives
- Selecting an alternative
- Creating a finished product
- Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc)

- Mastering a specific job task/procedure

- Emphasize to students that their work will be evaluated according to the following criteria:

1. Writing the commercial
   a. Creativity of idea
   b. Persuasiveness of commercial
   c. Time limitations met
   d. Necessary information provided
   e. Product name 3 times
   f. Explanation of product use
   g. Creation of mood
   h. Neatness

2. Acting out the commercial
   a. Delivery (appearance, gestures, tone of voice, etc.)
   b. Persuasiveness (salesmanship)

- If students have difficulty following written instructions:

  - Discuss the possible consequences of not following instructions precisely.

  - Have them read the instructions several times, noting the key words and ideas.

- If students have difficulty stating ideas clearly:

  - Instruct them to organize their thoughts before they begin to write.

  - Instruct them to use simple, concise language.

  - Discuss the importance of choosing words that convey the desired meaning.

    EXAMPLE: "The odor of chicken" does not convey the same meaning as "the aroma of chicken" although both words describe the smell.

- If students have difficulty making informative presentations:

  - Instruct them to organize their information before they begin the presentation.

  - Instruct them to learn the information they are presenting instead of memorizing a speech.

- Suggest they practice the presentation before presenting it.

- If students have difficulty making a persuasive presentation:
  - Have them list the points that they hope to persuade their audience to believe.
  - Remind them that the strongest device for convincing others is evidence.
  - Discuss some methods of persuasion that are commonly used.

    EXAMPLE: Using the endorsement of a famous person. "Bo knows baseball."
  - Suggest they practice the presentation before presenting it.

- If students have difficulty selecting words effectively:
  - Suggest they examine a dictionary and a thesaurus in order to increase their vocabulary.
  - Discuss the importance of selecting words carefully to convey the desired meaning.

    EXAMPLE: Diet plans promise to make you "slim" or "slender," not "skinny" or "scrawny."

- If students have difficulty adapting presentation to a specific audience:
  - Discuss the reasons why certain topics would be of interest to one audience but not to another.

    EXAMPLE: A senior citizen group might be interested in a program about Medicare, but might not be interested in a program about Madonna.
  - Have them list any information they have about the audience.

- If students have difficulty identifying critical elements/issues:
  - Suggest they construct a short outline of the material.
  - Suggest they read or examine the material carefully and ask themselves, "What is the important point?"

- If students have difficulty identifying/developing alternatives:
  - Suggest they use intuitive thinking techniques.
  - Suggest they discuss ideas and alternatives with other students.
- If students have difficulty selecting an alternative:
  - Instruct them to examine the pros and cons of each alternative.
  - Instruct them to stay focused on their main goal and examine each alternative.
- If students have difficulty creating a finished product:
  - Discuss with them the importance of focusing on a main goal.
  - Suggest they make a list of steps to take in reaching that goal.
  - Discuss with them the fact that sometimes a first alternative may not work.
  - They should be flexible and try a different alternative.
  - Suggest they delegate the responsibilities.
  - Suggest they work one step at a time.
- If students have difficulty applying intuitive thinking techniques, (brainstorming, lateral thinking, divergent thinking, etc.):
  - Define and demonstrate the techniques.
  - Have them practice the thinking techniques.
- For additional suggestions on teaching basic skills refer to Instructional Supplement 1.

Name ______________________ Score __________

OBJECTIVE 9 **Write a television commercial.**

INTRODUCTION

You've seen thousands of television commercials. There were some you really liked, some you thought were stupid, and some you just didn't pay attention to. Now it's your turn to make a commercial. Your goal is to get the viewer's attention, then convince him or her to buy your product.

DIRECTIONS

1. Choose a product. It can be real or imagined.
2. Write a television commercial for the product, following these guidelines:
   - The commercial must last exactly 30 seconds.
   - The product name must be given at least three times, the more times the better.
   - If you are advertising a business or service, the address, telephone number, and other necessary information must be given.
   - If you are advertising an imaginary product, you must explain its use.
   - Your commercial must create a mood that will help sell the product.

   EXAMPLE: "Tutors Unlimited" quality tutoring service would want to create a mood of reliability and expertise. ("Tutoring by trained instructors who have completed all courses with at least a 3.5 GPA; guaranteed to improve your scores.")
3. Act out your commercial in your classroom.

   NOTE: You might need to invite classmates to appear in your commercial.

Functional Reading Skills
- Follow written instructions

Language Skills
- State ideas clearly

Oral Presentation Skills
- Make informative presentations
- Make persuasive presentations
- Select/use words effectively
- Adapt presentation to specific audience

Cognitive Activities Skills

- Identify critical elements/issues
- Identify/develop alternatives
- Select an alternative
- Create a finished product
- Apply intuitive thinking techniques

Job Acquisition/ Development Skills

- Master specific job task/procedure

SUGGESTED
EVALUATIVE CRITERIA

1. WRITING THE COMMERCIAL	
a. Creativity of idea	20 points
b. Persuasiveness of commercial	15 points
c. Time limitations met	10 points
d. Necessary information provided	10 points
e. Product name 3 times	10 points
f. Explanation of product use	10 points
g. Creation of mood	10 points
h. Neatness	5 points
2. ACTING OUT COMMERCIAL	
a. Delivery (tone of voice, etc.)	5 points
b. Persuasiveness (salesmanship)	5 points
TOTAL	100 points

ASSIGNMENT SHEET 3

Development of:
WRITING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, creative thinking/problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

WRITING SKILLS

- Stating ideas clearly
- Constructing graphics & symbols

CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues
- Identifying/developing alternatives
- Evaluating alternatives
- Selecting an alternative
- Creating a finished product
- Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc.)

EMPLOYABILITY SKILLS

- Mastering a specific job task/procedure

- Emphasize to students that their work will be evaluated according to the following criteria:

  1. Writing
     a. Word limitation met
     b. Effective use of words
     c. Necessary information included

  2. Composition
     a. Center of interest
     b. Effective use of artwork
     c. Neatness

- If students have difficulty constructing graphics and symbols:

  – Suggest they examine a variety of graphics.

  – Discuss the elements of a good graphic display.

- For additional suggestions on teaching basic skills refer to Instructional Supplements 1 and 2.

ASSIGNMENT SHEET 3

AGRICULTURAL SALES AND SERVICE

XII

Name ______________________________ Score __________

OBJECTIVE 10

Write a newspaper advertisement.

INTRODUCTION

Newspaper advertisements are some of the most effective for small businesses. They can be very flexible and may include coupons or special discounts. They can be scheduled to appear on certain days and placed in sections of the paper your customers are most likely to read.

Newspaper advertisements are different than television commercials in several important ways. Fewer words are used. The appearance of the ad must compete with the other ads surrounding it. It is limited in the artwork it can include.

On the other hand, the newspaper ad can be very direct. A sale item, a celebrity, a business name, or whatever the center of interest is, can be much more dominant.

Newspaper ads are constructed very much like posters. Margins, centers of interest, clean lines, and uncluttered space are all important.

They are also constructed much like newspaper articles. The more important the item of information, the more prominent its placement. Like a good newspaper story, a good newspaper advertisement includes who, what, when, where, why, and how.

DIRECTIONS

Language Skills
- State ideas clearly

Composition Skills
- Construct graphics & symbols

1. Choose one of the topics below.
   - Agricultural education
   - Your school's athletic team
   - Protecting wildlife
   - Protecting the environment
   - Recycling

Cognitive Activities Skills

- Collect/record information
- Identify critical elements/issues
- Identify/develop alternatives
- Evaluate alternatives
- Select an alternative
- Create a finished product
- Apply intuitive thinking techniques

Job Acquisition/ Development Skills

- Master specific job task/procedure

2. List the information you would include in the ad.

Who ______________________________

What ______________________________

When ______________________________

Where ______________________________

Why ______________________________

How ______________________________

Other ______________________________

____

Artwork (describe) ______________________________

____

____

3. Reduce the information above into no more than 35 words, not including the description of the artwork. Try to come up with sales phrases that address more than one point, such as "Let's all pitch in" answering both who and what.

____

____

____

____

____

____

____

____

____

____

____

4. Arrange the wording and artwork you have chosen in the box below.

SUGGESTED EVALUATIVE CRITERIA

1. WRITING	
a. Word limitation met	10 points
b. Effective use of words	25 points
c. Necessary information included	15 points
2. COMPOSITION	
a. Center of interest	20 points
b. Effective use of art work	15 points
c. Neatness (margins, uncluttered areas, etc.)	15 points
TOTAL	100 points

ASSIGNMENT ANSWERS

AGRICULTURAL SALES AND SERVICE XII

ASSIGNMENT SHEET 1

This assignment was designed to reflect current pricing and fees. Prices do not need to be confirmed, but should be reasonably correct. All math calculations should be correct.

ASSIGNMENT SHEET 2

Commercials should meet the following requirements:

- Lasted no less than 25 seconds and no more than 35 seconds
- Name was given a minimum of three times
- If a service or business was advertised, the telephone number and address were given
- If an imaginary product was advertised, its use was explained
- An appropriate mood was created that helped sell the product or service

ASSIGNMENT SHEET 3

The completed ad should not contain more than 35 words. Artwork should be appropriate. The most important information should be most prominently placed.

JOB SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, science, oral communication, interpersonal or relating, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions

  WRITING SKILLS

  - Completing forms and records

  MATHEMATICS SKILLS

  - Collecting/recording data
  - Making change
  - Calculating sales tax

  ORAL COMMUNICATION SKILLS

  - Communicating with clients/customer

  INTERPERSONAL OR RELATING SKILLS

  - Interacting with client/customer

  EMPLOYABILITY SKILLS

  - Mastering a specific job task/procedure
  - Practicing good work habits/attitudes
  - Dealing effectively with customers/clients

- If students have difficulty completing forms and records, examine the structure of the forms being used.
- If students have difficulty making change:
  - Demonstrate the correct way to make change.
  - Suggest they practice counting change correctly.
- If students have difficulty calculating sales tax:
  - Discuss the impact that mistakes in sales tax computation can have on a business.
  - Demonstrate the correct way to calculate sales tax.
  - Encourage them to practice calculating sales tax.
- If students have difficulty using scientific instruments (cash register), demonstrate the proper use of the instrument.
- If students have difficulty communicating with or interacting with client/customer, have the student review listening skills, questioning skills, giving/following oral directions, and non-verbal communication.
- If students have difficulty practicing good work habits/attitudes:
  - Review what is expected of the student.
  - Discuss the importance of good work habits/attitudes in obtaining and retaining employment.
- For additional suggestions on teaching basic skills refer to Instructional Supplements 1 and 2.

JOB SHEET 1 — AGRICULTURAL SALES AND SERVICE — XII

OBJECTIVE 11

Complete a business transaction.

INTRODUCTION

Businesses today realize that the employees who have direct contact with the public play a major role in getting and keeping customers. These employees should be well informed, know their jobs, and be able to complete transactions quickly and cheerfully.

EQUIPMENT AND SUPPLIES

- Cash register
- Order pad and pencil
- Play money
- Sack
- Empty fast-food containers
- Menu with prices
- Forks
- Napkins
- Catsup and salt

PROCEDURE

Role-play the part of a fast-food employee.

1. Greet the customer cheerfully and appropriately.
2. Write the order down and repeat it to the customer.
3. Total the customer's order and add the appropriate tax.
4. Tell the customer the total cost.
5. Take money from the customer, politely, and make change.

   To make change, begin counting at the customer's total cost and add change until you reach the amount the customer paid. For example, if the total cost was $2.19 and the customer paid with a five dollar bill you would:

   – Begin counting at $2.19

   – Get one penny for change (count is now $2.20)

   – Get one nickel for change (count is now $2.25)

   – Get three quarters for change (count is now $3.00)

   – Get two dollars for change (count is now $5.00)

Functional Reading Skills
- Follow written instructions

Functional Writing Skills
- Complete forms & records

Data Analysis and Display Skills
- Collect/record data

Functional Math Skills
- Make change
- Calculate sales tax

6. As you give the change back to the customer, count it aloud.

7. Sack the customer's order and give it to the customer. Be sure to include forks, napkins, catsup, etc.

8. Give the customer his or her order promptly.

9. Smile and say, "Thank you."

10. Put away equipment and clean work area.

Interactive Communication Skills
- Communicate with clients/customers

General Relating Skills
- Interact with clients/customers/patients

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes
- Practice good personal presentation
- Deal effectively with customers/clients

JOB SHEET 2

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
ORAL COMMUNICATION
INTERPERSONAL OR RELATING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, oral communication, interpersonal or relating, creative thinking and problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Gaining factual information

  WRITING SKILLS

  - Stating ideas clearly

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Making change

  ORAL COMMUNICATION SKILLS

  - Making persuasive presentations
  - Working effectively in a group
  - Communicating with client/customer

  INTERPERSONAL OR RELATING SKILLS

  - Interacting with client/customers/patients
  - Participating in group activities

CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues
- Identifying/developing alternatives
- Evaluating alternatives
- Selecting an alternative
- Creating a finished product
- Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc.)
- Transferring knowledge/training to new situations
- Evaluating results/outcomes

EMPLOYABILITY SKILLS

- Mastering a specific job task/procedure

- If students have difficulty transferring knowledge/training to new situations:
  - Instruct them to review the information needed.
  - Discuss the various applications of their training.
  - Discuss with them the fact that true learning is the ability to apply the knowledge/training they have acquired and is crucial in life.
- If students have difficulty evaluating results/outcomes:
  - Instruct them to make a list of their anticipated goals and compare the list to the actual results.
  - Discuss with them ways to improve the project.
  - Suggest they identify any problem areas.
  - Suggest they identify any success areas.
  - Remind them that they are evaluating results/outcomes in order to gain new knowledge and insights.
- For additional suggestions on teaching basic skills refer to the Instructional Supplements 1-3.

JOB SHEET 2

AGRICULTURAL SALES AND SERVICE

XII

OBJECTIVE 12 **Complete a class project in sales and service.**

INTRODUCTION

In this job sheet you will use all that you have learned in this unit. You and your classmates should work as a team in order to successfully complete a project.

EQUIPMENT AND SUPPLIES

- Sales information and product, as distributed by your instructor

  EXAMPLES: Sausage sales, slave sales, horticulture projects

PROCEDURE

1. Review the information your instructor distributes.
2. Participate in the sales project.
3. Use Job Sheet 3 to prepare posters to promote your project.
4. Collect sales money and distribute sales merchandise.
5. Total money collected and turn it in to your instructor.
6. Write a report evaluating the strengths and weaknesses of your part of the project.

Reading Comprehension Skills
- Gain factual information

Language Skills
- State ideas clearly

Operation and Calculation Skills
- Calculate with whole numbers

Functional Math Skills
- Make change

Oral Presentation Skills
- Make persuasive presentations

Interactive Communication Skills
- Work effectively in a group
- Communicate with clients/customers

General Relating Skills
- Interact with clients/customers/patients
- Participate in group activities

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues
- Identify/develop alternatives
- Evaluate alternatives
- Select an alternative
- Create a finished product
- Apply intuitive thinking techniques
- Transfer knowledge/training to new situations
- Evaluate results/outcomes

Job Acquisition/ Development Skills
- Master specific job task/procedure

JOB SHEET 3

Development of:
READING SKILLS
WRITING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, creative thinking and problem solving, and employability skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Using magazines and newspapers
- Following written instructions

WRITING SKILLS

- Stating ideas clearly
- Constructing graphics and symbols

CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues
- Identifying/developing alternatives
- Evaluating alternatives
- Selecting an alternative
- Creating a finished product
- Applying intuitive thinking techniques (brainstorming, lateral thinking, divergent thinking, etc)

EMPLOYABILITY SKILLS

- Mastering a specific job task/procedure
- Practicing good work habits/attitudes

- For additional suggestions on teaching basic skills refer to Instructional Supplements 1-4.

OBJECTIVE 13 **Prepare a poster.**

INTRODUCTION

Have you been to the video store lately? Did you look at the posters in the front windows? Some of them make even bad movies look good. In Hollywood, people make lots of money designing posters. You can use their "tricks" to make great posters, too.

EQUIPMENT AND SUPPLIES

- Posterboard
- Magic markers
- Rubber cement
- Ruler
- Scissors
- Magazine illustrations
- Pencil and eraser
- Paper

PROCEDURE

1. Plan the poster.

   - Decide what you want to include in your poster.

   - Cut out magazine illustrations or draw your artwork on a piece of paper. Try not to use more than one illustration. Remember that you can use diagrams or charts instead of pictures. If you have to use more than one illustration, make one drawing larger than the others and put it in the middle of the poster. Make the smaller illustration less detailed and less colorful. Put them near or slightly overlapping the main illustration.

   - The most common problem with posters is too much "copy." Try to limit your poster to 25 words plus a title and labels. Decide what you need to label, write, or explain on your poster. Labels should be small.

     NOTE: If you are using a chart instead of an illustration, don't count the words in the chart. Try not to use any other words, except for the title and keep the chart as simple as possible. Making each column a different color will also make it easier to use.

Research and Reference Skills
- Use magazines and newspapers

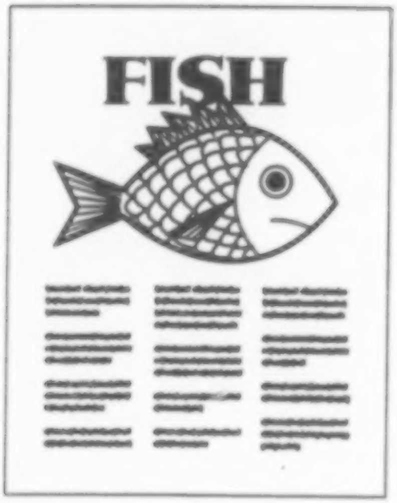
Functional Reading Skills
- Follow written instructions

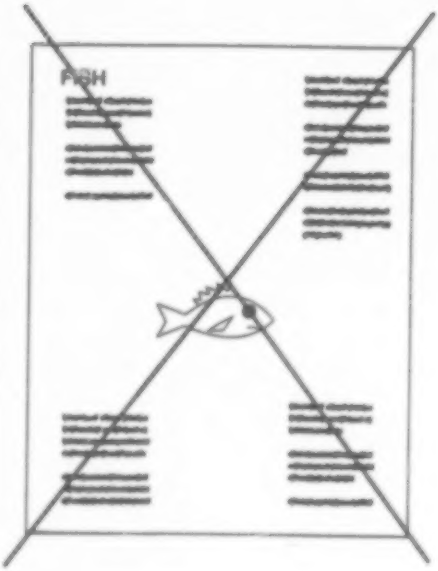
Language Skills
- State ideas clearly

Composition Skills
- Construct graphics & symbols

2. Lay out the poster.

- Put the main illustration (called center of interest) in first. Arrange other things around it.





Cognitive Activities Skills

- Collect/record information
- Identify critical elements/issues
- Identify/develop alternatives
- Evaluate alternatives
- Select an alternative
- Create a finished product
- Apply intuitive thinking techniques

- Leave at least a one-inch margin on all sides of the poster.

  NOTE: A margin larger than one inch may look better on your poster. A one inch margin is the minimum. When you lay your artwork and labels on the posterboard, look at the margins and see what "looks right."

- Try two or three arrangements before pasting anything down.

3. Paste the artwork on.

- Use rubber cement instead of glue.
- If rubber cement seeps out from under a picture or label, let it dry then rub it off.

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Practice good work habits/attitudes

4. Add lettering and titles.
   - Whenever possible, draw or type lettering on a separate piece of paper and glue it on.
   - If you do write directly on the poster, very faintly mark guidelines and lightly letter everything in pencil first, then go over it with ink.
   - Make all your titles at least one inch high.
5. Clean it up.
   - If you make a mistake, cover it up. Index cards and envelopes are usually the same color as white poster board. Magazine artwork is harder to match, but you may be able to cover mistakes with lettering or arrows.
   - Use an eraser to remove fingerprints.
   - Be sure your name is on your poster.
6. Have your instructor check your work.
7. Put away tools and materials and clean the work area.

PRACTICAL TEST 1

AGRICULTURAL SALES AND SERVICE

XII

JOB SHEET 1

Complete a business transaction.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Greeted the customer cheerfully and appropriately	___	___
2. Wrote the order down and repeated it to the customer	___	___
3. Totaled the customer's order and added the appropriate tax	___	___
4. Told the customer the total cost	___	___
5. Took money from the customer politely, and made change	___	___
6. Gave correct change to the customer	___	___
7. Sacked the customer's order and gave it to the customer, including forks, napkins, catsup, etc.	___	___
8. Gave the customer his or her order promptly	___	___
9. Smiled and said, "Thank you."	___	___

10. Performed steps in a timely manner ___ ___

11. Provided satisfactory responses to questions asked ___ ___

12. Put away equipment and cleaned work area ___ ___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Treated customer courteously	4	3	2	1
Took order correctly	4	3	2	1
Handled cash register competently	4	3	2	1
Made change correctly	4	3	2	1
Put away equipment and cleaned work area	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training

3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required

2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill

1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 2

AGRICULTURAL SALES AND SERVICE

XII

JOB SHEET 2

Complete a class project in sales and service.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Reviewed the information distributed	___	___
2. Participated in the sales project	___	___
3. Prepared posters to promote project	___	___
4. Collected sales money and distributed sales merchandise	___	___
5. Totaled money collected and turned it in to the instructor	___	___
6. Completed a report analyzing his/her part of the project	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Participated in the project	4	3	2	1
Followed directions	4	3	2	1
Handed money in on time and in the correct amount	4	3	2	1
Analyzed his/her part in the project	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3

AGRICULTURAL SALES AND SERVICE

XII

JOB SHEET 3

Prepare a poster.

Student's name ______________________ Date ____________

Evaluator's name ______________________ Attempt no. ______

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Decided the subject of the poster	___	___
2. Cut out magazine illustrations or drew artwork	___	___
3. Used one piece of artwork or made center of interest larger and more detailed	___	___
4. Put center of interest in the middle of the poster	___	___
5. Limited poster copy to 25 words plus a title and labels	___	___
6. Left a one inch margin on all sides of the poster	___	___
7. Tried two or three arrangements before pasting anything down	___	___
8. Pasted the artwork on correctly	___	___
9. Added lettering and titles	___	___

10. If lettered directly on the poster, marked guidelines and lightly lettered everything in pencil first ___ ___

11. Made all titles at least one inch high ___ ___

12. Covered any mistakes ___ ___

13. Used an eraser to remove fingerprints ___ ___

14. Put name on poster ___ ___

15. Used proper tools correctly ___ ___

16. Performed steps in a timely manner ___ ___

17. Provided satisfactory responses to questions asked ___ ___

18. Put away tools and cleaned work area ___ ___

EVALUATOR'S COMMENTS ______________________________

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed directions	4	3	2	1
Prepared a poster	4	3	2	1
Put away tools and cleaned work area	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

AGRICULTURAL SALES AND SERVICE

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with agricultural sales and service to their definitions. Write the correct letter in the blank.

_____ 1. A document proving payment

_____ 2. A fee charged to citizens or added to purchases to finance government programs

_____ 3. A person who forms a business, assumes the risk involved, and earns any profit produced

_____ 4. A list of products, services, and fees presented as a request for payment

_____ 5. Charges or costs

_____ 6. Labor, knowledge, or assistance offered and sold as a product

_____ 7. Money charged, usually as a percentage, for borrowing money or charging purchases

_____ 8. The distribution and use of money

_____ 9. The money, tools, and other items necessary to produce a product or deliver a service

a. bill
b. capital
c. economics
d. entrepreneur
e. expenses
f. exports
g. fees
h. fines
i. funding
j. imports
k. interest
l. invoice
m. receipt
n. service
o. stockholder
p. tax

May be photocopied for student use.

_____ 10. Products sent to other countries

_____ 11. Products brought from other countries

OBJECTIVE 2

Match functional areas of an organization to their descriptions. Write the correct letter in each blank.

_____ 1. Informs the public about the product or service and encourages them to buy it

_____ 2. Manages the day-to-day and long term business operations such as hiring employees, coordinating divisions, and supervising operations

_____ 3. Meets after-purchase customer needs

_____ 4. Records, classifies, and summarizes financial transactions

_____ 5. Studies a product's uses, designs improvements and new products

_____ 6. Studies the population, their habits, and sales records to advise the company on advertising, new products, etc.

_____ 7. The actual manufacturing of the product

a. accounting

b. administration

c. advertising

d. applied science

e. bookkeeping

f. customer service

g. marketing

h. production

i. research and development

j. supervision

May be photocopied for student use.

OBJECTIVE 3

Select from a list true statements about international markets. Write an "X" in the blank before each true statement.

_____ 1. Buying products from other countries and selling products to other countries is an important part of the economy.

_____ 2. A nation must conserve its natural resources and the money they are worth by selling them only at home.

_____ 3. A nation can use its natural resources to make a profit, while sharing those resources with the rest of the world.

_____ 4. Buying products from other countries and selling products to other countries is a very new trend.

_____ 5. The United States exports animal feeds, cotton, hides and skins, tobacco, grains, horticultural products, corn, wheat, soybeans, and meat to other countries.

_____ 6. International markets don't affect prices inside the United States.

_____ 7. The United States imports animals, coffee, grain, fruits, nuts, cocoa, meat, and vegetables from other countries.

_____ 8. We export more agriculture products than we import.

_____ 9. The United States imports animal feeds, cotton, hides and skins, tobacco, grains, soybeans, and meat from other countries.

_____ 10. International markets affect prices.

_____ 11. Sometimes countries try to protect their industries by imposing tariffs or embargoes.

May be photocopied for student use.

OBJECTIVE 4 **Choose the word or phrase that completes statements about customer relations.** Write the correct letter in each blank.

_____ 1. Products must meet customer needs of convenience and

a. selection
b. reliability
c. courtesy
d. size

_____ 2. "The customer is always right" is

a. not appropriate today
b. always right for some businesses, but not always for agricultural sales and service
c. good business
d. something useful for small businesses only

_____ 3. Good employees understand the importance of customer relations. They are

a. neat and clean, say "please" and "thank you," and deal with customers promptly
b. busy stocking shelves
c. talking, trying to make customers buy certain products
d. the best employees, even if they are not always accurate or reliable

_____ 4. Customer relations are improved when employees are prepared and

a. attractive
b. knowledgeable
c. highly-trained
d. responsible for one task only

OBJECTIVE 5 **List tasks involved in running a business.** List eight tasks in the spaces below.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

May be photocopied for student use.

5. ______________________________

6. ______________________________

7. ______________________________

8. ______________________________

OBJECTIVE 6 **Discuss entrepreneurship.**

1. Compare entrepreneurships to larger businesses.

____

____

____

____

____

____

2. Discuss the importance of entrepreneurship to America.

____

____

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____

____

OBJECTIVE 7 **Select from a list true statements about advertising.**

_____ 1. Many experts say advertising is the strongest force in America today.

_____ 2. Advertising helps shape how we spend our money, how we dress, how we spend our time, what we eat, and what we want to look like.

_____ 3. All advertising is basically dishonest.

May be photocopied for student use.

_____ 4. Businesses encourage us to buy their products through advertising.

_____ 5. Advertising has a strong effect on young people, but a weaker effect on older Americans.

_____ 6. There are many types of advertising other than magazines, newspapers, and television.

_____ 7. Some advertising is basically education.

_____ 8. Advertising helps shape how we spend our money, but little else.

_____ 9. There are three types of advertisements: television, radio, and newspaper.

_____ 10. Sometimes celebrities endorse a product; movie stars and athletes make commercials or put their name and picture on the product.

_____ 11. Another method advertisers use is presenting a scene people will find attractive, as though using the product will make the consumer part of the scene.

_____ 12. Celebrities put their names on products because they own stock in the company.

_____ 13. Although there are "truth in advertising laws," some advertisements only present part of the truth or portray it in a biased manner.

_____ 14. The Federal Trade Commission can order false or misleading advertising to be withdrawn and can fine companies that break the law.

_____ 15. Advertisers use certain words or phrases they know you are looking for, such as "free," "discount," "low-interest," or "improved."

NOTE: Objectives 8-13 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

OBJECTIVE 1

1. m
2. p
3. d
4. l
5. e
6. n
7. k
8. c
9. b
10. f
11. j

OBJECTIVE 2

1. c
2. b
3. f
4. a
5. i
6. g
7. h

OBJECTIVE 3

1, 3, 5, 7, 8, 10, 11

OBJECTIVE 4

1. b
2. c
3. a
4. b

OBJECTIVE 5

List may include any eight of the following:

- Produce the product on schedule
- Fill and ship or deliver all orders
- Keep all tools and machinery in good operating condition
- Pay all bills and taxes on time
- Research and design new products

- Watch the markets and identify trends affecting the business
- Network with other people in similar businesses
- Hire and train employees
- Maintain a cash-flow that allows you to pay bills and salaries
- Supervise advertising and promotional events
- Make sure quality and customer satisfaction remain high
- Interpret marketing information
- Learn about new technology that affects your business and product
- Maintain certifications and licenses

OBJECTIVE 6

1. Discussion should include the following:
   - Large companies can raise money by selling stock, but entrepreneurs accept the risk of beginning a business without that help.
   - Most small business owners invest their own savings or borrow money.
   - If the business fails, entrepreneurs lose their money, but if the business succeeds, they get the rewards.
2. Discussion should include any 3 of the following:
   - More than 80 percent of all jobs are in companies with fewer than 100 employees.
   - More than one million new businesses are started each year, most of them by entrepreneurs.
   - Small businesses provide the marketplace with new products and processes.
   - Small businesses give stability to our economy.
   - Changes that affect large businesses may not affect small businesses.

OBJECTIVE 7 1, 2, 4, 6, 7, 10, 11, 13, 14, 15

OBJECTIVE SHEET

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

INTRODUCTION

You've heard about the problems our environment faces: holes in the ozone layer, over-population, nuclear and medical waste, landfill groundwater contamination, etc. Perhaps your family or school recycles paper or aluminum cans. You've probably discussed some of these problems in school. It may seem like you hear these things over and over. Because these problems affect our world and our ability to survive, they are important to us all.

How do these important questions affect agriculture? Think about it--how could a farmer raise crops if water, soil, sunshine, and air were not available? How can anyone be expected to work outside if the ozone layer can't block harmful radiation? Can farmers grow enough food to feed the world if the population continues to grow at its present rate? What land will be left for farming if weather patterns change and cities continue to grow? How have agricultural practices contributed to these problems? What can you do, now or in the future, to help solve these problems?

UNIT OBJECTIVE

After completing this unit, the student will be able to recognize and discuss the importance of the environment, the interdependence of all things, the effects of air and water pollution, and how they affect agriculture. The student will be able to use composting to help protect the environment. The student will demonstrate these competencies by completing assignment sheets, job sheets, practical tests, and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with agricultural ecology and the environment to their definitions.
2. Select from a list true statements about water conservation and purification.
3. State effects of polluted air on people, structures, and agriculture.
4. Choose the word or phrase that completes statements about technology and the environment.
5. Debate a current ecological concern. (Assignment Sheet 1)

6. Calculate the amount of usable water on Earth. (Assignment Sheet 2)
7. Observe biodegradability in a compost pile. (Job Sheet 1)
8. Compare growth in various types of water. (Job Sheet 2)
9. Test the effects of acid rain on agriculture. (Job Sheet 3)

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.
- Study the specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Make arrangements for guest speakers. Speakers for this unit might include a Corps of Engineers representative, a chemist, a representative from the American Lung Association, a doctor or respiratory therapist, a representative from your local government, waste disposal system, or water treatment system, or a representative from the Sierra Club or Audubon Society.

  NOTE: Supply speakers with specific objectives and other appropriate sections of the unit.

- Make arrangements for any audiovisual equipment that will be needed for this unit.
- Arrange to have all materials and supplies necessary to complete job sheets.
- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with agricultural ecology and the environment to their definitions.

- Use terms in Student Supplement 1 to expand the list. These related terms are not used in the objective information.
- Have students look in the glossaries of their other textbooks for

these or other related words. Have them compare definitions.

- Have students list other words they think of in connection with ecology and the environment. Have them define the words.
- Have students complete the Activity Sheet.
- List strange-sounding words that relate to the environment and have students play a game making up definitions of the words based on sounds.
- Have students begin bringing in packages and advertisements that deal with the environment. Have them suggest why the manufacturer chose to use the words used and what the words do not tell. For example, a cleanser might come in a container marked "smaller package -- less waste" but not say that the price for the small package is the same as the price of the large package it replaced or mention the effect of cleansers on our water system.
- Have students complete Assignment Sheet 1.

Objective 2: Select from a list true statements about water conservation and purification.

- Take students to visit your local sewer and/or water purification system.
- Use Transparency Masters 1 and 2 to diagram the water system.
- Have students view water samples from several sources through a microscope. Invite a chemist to discuss what they find or have students draw what they see.
- Have students try to measure the amount of water they use in one day.
- Have students survey their home or school for water conservation. Suggest checking for dripping faucets or leaking pipes.
- Have students suggest one thing each person can do to help conserve water. Frequently mentioned suggestions are: put a brick in toilet tanks to reduce water levels; take showers instead of baths; wash dishes by hand instead of with a dishwasher; turn the water off while brushing teeth.
- Have students complete Assignment Sheet 2.

Objective 3: State effects of polluted air on people, structures, and agriculture.

- Have students collect newspaper articles involving air quality.
- Use Transparency Master 3 to show sources of air pollution.
- Have students read Supplement 2 and compare U.S. and Japanese policies.
- Invite a representative from the American Lung Association, a doctor, or a public health official to discuss the importance of clean air.
- Put one plant in a closed container with polluted air and another in a container with clean air. Have students compare the results.
- Discuss the concept of personal air and what they can do to keep their own air supply clean.
- Review information presented in previous units.

Objective 4: Choose the word or phrase that completes statements about technology and the environment.

- Have students discuss new technologies they think someone should invent.
- Have students draw what they think the city of the future will look like and discuss how technologies shown will affect the environment as well as how the environment has been affected.
- Have students each bring a newspaper, magazine, or television tape discussing a new technology designed to protect the environment.
- If possible, have students look at an electric car.
- Contact the engineering department of a nearby university for events or projects the students might be interested in.
- Have an automotive mechanic discuss how environmental concerns has affected automotive design.
- Have students complete Job Sheets 1 and 2.

APPLICATION

Objective 5: Debate a current ecological concern.

- A list of possible topics is included, but if current problems face your community, encourage students to research and debate those questions.
- Present debate competition information to students.
- Have students listen carefully to each speaker and list environmental questions the speaker does not answer.
- Set time limits, etc., according to those to be used in upcoming competitions or to meet your needs.
- Review debate guidelines presented in previous units.
- Invite representatives of each side of the argument to work with students and view the debate.
- Use Student Supplement 2 for supplemental information.

Objective 6: Calculate the amount of usable water on Earth.

- Students might find these problems difficult without using calculators.
- Bring a globe, five gallons of water, and a tablespoon to class to give students a visual frame of reference.
- Discuss ratios.
- Point out how little water is usable by asking students to make the calculations, then have them remove the appropriate amount from the five gallons of water.
- Have students discuss the importance of the oceans as a water source, the importance of protecting the oceans, and the benefits of desalinization programs.

Objective 7: Observe biodegradability in a compost pile.

- Have students collect packages that claim to be biodegradable. Have them test just how biodegradable they actually are.
- Invite a representative of your local government to discuss community composting.
- Have students present their findings to the school and suggest changes or programs the school should adopt.
- Discuss special considerations for medical and nuclear waste.

- Archaeologists frequently learn more about how a culture lived by studying their dumps than their buildings. Have students discuss what future archaeologists will discover about us from our dumps.

- Use Student Supplement 3 to predict biodegradability.

Objective 8: Compare growth in various types of water.

- If possible, take students with you to collect the pond water.

- View the pond water under a microscope to be sure it has an adequate number of living organisms.

- Complete the scientific process by asking students to hypothesize what the changes in each jar will be.

- Discuss the importance of over fertilization and compare it to under fertilization.

Objective 9: Test the effects of acid rain on agriculture.

- Have students examine the roots of the seedlings and compare them.

- Include a variety of plants in each flat, including peppers, tomatoes, or other acid-loving plants.

- Invite a chemist to discuss what acids are, what they do, and how sulfuric acid is similar to and different from vinegar.

- Complete the scientific process by having students hypothesize what the outcome will be. Each hypothesis should be specific.

- Allow students to complete Job Sheet 3 as a class project.

EVALUATION

Pretest

- Give written test as pretest.

- Determine individual study requirements.

- Counsel students individually on pretest results and study requirements.

- Modify material in unit or create supplementary materials for individual students as required.

Practical Test

- Explain to students that they will be asked to demonstrate procedures on the job sheets to complete the practical test.
- Describe the rating scale used on the practical test.
- Reteach and retest as necessary.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- Oklahoma Department of Vocational and Technical Education, Resource Center, Attn: Instructional Media Specialist, 1500 West Seventh Avenue, Stillwater, OK 74074. The following films are available on a free-loan basis to Oklahoma teachers.

  Acid Rain, 1985. The video surveys the mounting damage occurring worldwide from acid rain. What is it? How does it occur? These questions are clearly illustrated by using a chemical distillation apparatus -- acid rain is actually produced in the laboratory, and the demonstration is used to show how acid rain enters and remains in the water cycle in our planet's closed system. Serious concerns are also raised about its affect on human health. Finally, the video illustrates some efforts of science, industry, and government toward solutions to this growing problem, but makes it clear that there are no easy answers. (17 minutes, color, VHS)

866

Degradable Plastics and the Environment, 1988. Garbage, trash, rubbish -- call it what you will -- is all around us. It's not the products or the materials they're made from, but the volume that is becoming a problem we can no longer ignore. (17 minutes, color, VHS)

The Killing Ground, 1989. An in-depth look at the dangers and problems caused by past and present toxic chemical waste disposal sites in the United States. (52 minutes, color, VHS)

On American Soil, 1985. In this award-winning video, we see the nature and extent of the soil erosion problem in America today. Through interviews with farmers and soil conservation experts, and the use of old photographs and film clips, *On American Soil* explains the economic bind in which farmers find themselves. Contradictory government policies that have undermined the effectiveness of soil conservation programs during the past 50 years are also discussed. (28 minutes, color, VHS)

Recycling: Waste into Wealth, 1985. As landfills everywhere start to overflow, recycling is no longer the concern of environmentalists. It has become a top priority for thousands of local communities and for state governments across the country. This creatively produced documentary features state-of-the-art recycling techniques including curbside pick-up services, drop-off recycling centers, material separation, and processing into new products. (29 minutes, color, VHS)

- *Water: A Clear and Present Danger*, 1983. This ABC News Closeup reveals that chemicals known to cause birth defects, neurological damage, and cancer are leaking into our underground water supply from above-ground sources, "turning this universal source of life into a source of fear," according to Correspondent Marshall Frady. (27 minutes, Color, VHS)

- *Paul Ehrlich's Earth Watch*. Relations Media, 175 Tompkins Avenue, Pleasantville, NY 10570-9973, 1-800-431-2050. Paul Ehrlich, Stanford University biologist and renowned author shows students the three biggest environmental problems: population growth, wildlife species extinction, and global warming and includes cures, as well as explanations of the problems. (18 minutes, color, VHS)

Print Media

- A number of publications relating to this unit are available through the Oklahoma State University Cooperative Extension Service and Agricultural Experiment Station. To order, contact Oklahoma State University, Central Mailing Services, Oklahoma State University, Stillwater, OK, 74078-0550, or contact your county extension agent.

- *Coming Full Circle: Successful Recycling Today.* Environmental Defense Fund, 257 Park Avenue South, New York, NY 10011.

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INFORMATION SHEET

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

OBJECTIVE 1

Match terms associated with agricultural ecology and the environment to their definitions.

- **acid rain** — acidic precipitation caused by air pollution; can harm and/or kill land and aquatic plants, aquatic insects, and fish; can erode man-made structures as well as rock and stone

  NOTE: Motor vehicles and coal-burning power plants are the largest human-caused contributors of elements that cause acid rain.

- **biodegradability** — the ability of a substance to be broken down into simple compounds such as carbon or water
- **biosphere** — an environment in which all items needed by living things within the environment are produced by the environment or other living things within it

  EXAMPLES: The Earth, a sealed terrarium

- **composting** — a method of waste disposal in which waste materials are broken down into simple compounds and used as humus
- **conservation** — protecting from loss or depletion
- **contamination** — containing impurities
- **ecology** — study of living organisms and how they relate to one another and their environment
- **environment** — natural surroundings
- **erosion** — wearing away
- **global warming** — warming of the earth caused by naturally-occurring gases and emission of human-caused gases
- **ground water** — naturally-occurring underground water systems
- **inorganic** — not living
- **organic** — plant and animal material; living material

- **ozone layer** – naturally occurring, thin shield of gas in the earth's stratosphere that protects the earth from the sun's dangerous ultraviolet radiation
- **pollution** – contamination of the environment with harmful substances
- **purification** – removal of pollutants
- **recycle** – to reuse

OBJECTIVE 2

Select from a list true statements about water conservation and purification.

The importance of clean water has been understood for centuries. Centuries ago in Europe, wealthy families had clean water delivered to their doors. Less expensive water services delivered more polluted water to other people. In 1800, William Cruikshank began adding chlorine to England's water systems. This method of purifying water is still used today.

According to the *1991 State of the World*, the reports used by the United Nations, 70 percent of the water used in the world, is used for irrigation. One third of the crops raised in the world come from the 17 percent of farmland that is irrigated.

Protecting our water supply, then, is important both to daily life and to agriculture.

The Earth and its atmosphere contains a set amount of water. Rather than water being formed and destroyed, it is recycled naturally. The rain in the puddle you stepped in this morning might evaporate, fall as snow on the South Pole, stay there for centuries before melting at the end of the next ice age, then evaporate again, fall as rain, be absorbed by a plant, and then be absorbed into the system of the animal eating the plant.

This same type of limited water is found in today's space flights. Each flight leaves with a set amount of water. The water must meet all the astronauts' needs during the mission. American astronauts save their waste water and bring it back to Earth, but Soviet astronauts recycle the water. All water used can be filtered, treated, and reused.

Water behaves differently in outer space. With the lack of gravity, it doesn't flow. For example, when astronauts exercise, sweat doesn't drip down their backs or foreheads. Instead, it pools. Some astronauts have described "disks" of sweat 10-12 inches across floating on their backs. They also explain that they must be careful not to move suddenly or the "disks" will fly off their backs and through the space craft.

Water today is contaminated several different ways. Underground water flows through landfills and other buried waste and becomes contaminated. Air pollutants are trapped in clouds and fall back to Earth in polluted rain. Sewage, industrial waste, and other pollutants are dumped into oceans, rivers, and other water sources.

Oklahoma, along with six other states, is affected by the Ogalala Aquifer, the groundwater system stretching from South Dakota south to Texas. Theoretically, anything affecting the water, soil, or air in any one part of the aquifer can affect ground water throughout the area. Because the Ogalala Aquifer covers few large cities and many farming areas, agriculture is the largest influence on the water's quality.

The aquifer's water has been harmed by over fertilizing and the use of pesticides that are carried into the groundwater by rain and irrigation. It has also been harmed by nitrate contamination from the cattle industry. As cattle are concentrated in feedlots, the soil is not able to absorb and break down wastes such as manure. The excess wastes are carried into the water system. Although the aquifer has been damaged by agricultural use, it is relatively free of acid and other pollutants frequently found in more populated areas of the country.

It has been estimated that in a city of one million people, about 31 tons of toilet bowl cleaner and 130.75 tons of liquid household cleaners are discharged into city drains each month.

— *The Green Lifestyle Handbook*

Once water is contaminated, it can be very difficult to purify. In nature, water purifies itself simply by flowing a short distance. At one time, pioneers looked for running water such as rivers or streams rather than ponds, because they knew the moving water would be fresh and safe.

Today purification is more difficult. Some pollution requires simple cleaning, such as removing trash from water or vacuuming oil floating on top of water. In other cases, the contamination can best be removed by adding microbes (microscopic animals) to the water. The microbes eat the contamination. In still other cases, chemicals are added to the water to counteract pollutants or the water is forced through mechanical filters.

In most cases, several methods are used. Your local water, for example, is probably filtered and then chemically treated.

Cleaning industrial wastes from water can be expensive. If the water is extremely polluted, especially with heavy metals, cleaning can be impossible.

OBJECTIVE 3

State effects of polluted air on people, structures, and agriculture.

Polluted air affects people, structures, and agriculture in several ways.

The Earth's atmosphere may seem endless, but is actually only about ten miles thick. Only the first 3-4 miles contain the oxygen humans need.

Hole in the ozone layer

In 1985, scientists discovered a hole in the ozone layer. This layer of the atmosphere protects us from harmful radiation. By 1987, scientists confirmed that the hole was caused by chlorofluorocarbons, used in air conditioning systems and aerosol cans. The Environmental Protection Agency has estimated that for every 1 percent of the ozone layer that is destroyed, the amount of harmful radiation reaching Earth increases by 2 percent. Increases in radiation levels will affect all living things. Humans will see increased rates of cataracts and cancer, especially skin cancer. Increased radiation will also affect the human immune system, making viruses, genetic defects, and many other medical conditions more likely. It is also expected to kill plankton and cause the death of many sea animals, reduce the amount of crops produced, and change the Earth's weather patterns. Crops exposed to harmful rays will mutate or burn. Most crops will have to be grown in northern regions, such as Canada or the former Soviet Union.

What is a CFC?

A few years ago, only chemists were familiar with the chloroflurocarbons. Today, preschoolers watch evil cartoon villains threaten the world with dreaded CFCs. But what are they?

CFCs are molecules made of carbon atoms bonded to chlorine and fluorine. They became important to many industries because they were not flammable or toxic, did not decompose easily, and did not react to other chemicals. They were widely used. In 1987, for example, more than 2.1 billion pounds of CFCs were used. In the USA alone, the CFC production industry made more than $28 billion per year.

CFCs are still produced, but their uses have been limited by government policies worldwide. For example, in the United States they can no longer be used as aerosol spray propellants and their use in air conditioning systems is being phased out.

However, even if all uses of CFCs ended today, they would continue to damage the atmosphere. It takes anywhere from 15 to 50 years for CFCs to reach the ozone layer.

Greenhouse effect

Another serious air pollution problem is called the Greenhouse Effect. As pollutants fill the atmosphere, warming radiation is trapped in the lower levels of the atmosphere. This can lead to changes in the Earth's weather patterns. Some areas might receive as much as 10 additional inches of rain each year, while other areas, including much of the United States, might receive little rain. As the Earth's temperature increases, the polar ice caps could melt, raising the levels of the oceans and flooding many coastal cities. Many scientists believe the Greenhouse Effect has already changed our weather patterns. They point to record high temperatures and droughts in the 1980s and to surveys showing that most oceans have risen 1 to 3 inches in the last 150 years.

Acid rain

Acid rain is another product of air pollution. As pollutants, especially sulfur emissions, are trapped in the air, they return to Earth in rain and other precipitation.

NOTE: Acid deposition, the return of these same pollutants through air currents rather than precipitation, is also a problem.

Acid rain is not a new problem. This source of pollution has reached serious levels in recent years, however, due to industry and automobile emissions. Acid rain can be deadly to water life, forests, crops, buildings, and humans.

In Sweden, as many as 40 percent of the lakes have been seriously affected by acid rain. In America, 7,000 lakes have been identified by the Environmental Protection Agency as at risk of acidification. Seventeen million acres of forests have been damaged by acid rain, including more than half of Germany's forests. Crops have been only slightly affected, but, as acidification increases, more crops will be harmed.

NOTE: At present, some crops are actually benefitting from acid rain. Alfalfa, green peppers, strawberries, and tomatoes grow better under these acidic conditions.

Historic buildings and works of art are being lost to acid rain. The Parthenon, the Acropolis, the Colosseum, and the Taj Mahal have all been harmed.

Cleopatra's Needle, a granite obelisk (a tall, thin structure) carved by Egyptians in 1500 B.C. survived without change for almost 3500 years in the Egyptian desert. However, a few years after being moved to New York City, it began chipping and flaking. Acid rain was blamed.

Acid rain has not been clearly linked to human health problems. However, several studies indicate that more people will suffer asthma, bronchitis, and heart disease due to acid rain. Acidified water also allows heavy metals, such as lead and mercury, to be dissolved into the water systems and lead to poisoning.

Radon

Radon is a gas naturally released into the atmosphere by rocks. Radon is always present, but is usually so diluted, it is harmless. But when homes or other structures are built over rocks, the radon cannot be released into the atmosphere. Instead, the radon concentrates in basements or under foundations. Cracks, pipe openings, and other spaces can vent the radon into homes. Once in the homes, the radon becomes trapped by insulation, storm windows, etc.

Although radon is a naturally-occurring gas, it has become a hazard. Only tobacco use causes more cases of lung cancer. The government has recommended that houses be checked for radon levels.

OBJECTIVE 4 **Choose the word or phrase that completes statements about technology and the environment.**

As we began to use modern technology, we disrupted many of Earth's natural systems. Our cars pollute the air, our factories pollute both the air and water, tankers spill oil into the ocean, and valuable land is used for landfill rather than for farming.

But technology is not an evil thing. The same technology that brought about many of our problems is being called on to solve them. Researchers have been able to pinpoint many pollutants and their sources, and can use that knowledge to reduce contamination.

TECHNOLOGY AT WORK?

As concern about the greenhouse effect and methane gas emissions increased, scientists began researching all major sources of methane, including cow belches. The first estimates suggested that as much as 15 percent of the Earth's methane was the result of cud-chewing burps. To research the issue further, the Environmental Protection Agency provided Washington State University with a $70,000 grant. Researchers at WSU fashioned backpacks for cattle being studied. Each backpack contained monitoring equipment with a tube positioned near the cow's mouth. The equipment will measure methane amounts in each belch for three years.

At about the same time, the Foundation on Economic Trends filed suit against the federal Agriculture, Interior, and Energy departments, claiming that the livestock grazing on federal land produces dangerous amounts of methane. If successful, the "cow pie case," as it is called, could require development of burpless cattle or a reduction in the amount of livestock allowed on federal land.

However, Cornell University researchers claim that cattle should not be considered an environmental danger, even if they do produce large amounts of methane, because they absorb carbon dioxide and other greenhouse gases. As Cornell's Duane Chapman explains, "...cows and agriculture are not the hazard to the atmosphere that some scientists have made them out to be."

One focus of technology is the removal of pollutants from the environment. For example, tall "scrubbers," smokestacks that remove pollutants before gases are released, are being used to cut air pollution and prevent acid rain. New filtration and chemical systems will reduce pollutants more than older systems.

Other technologies focus on preventing pollution. No-till farming decreases soil erosion. New landfill liners protect groundwater from contamination. New automobile designs reduce the amount of harmful emissions.

Still another focus is to replace current technology with safer methods or products. Scientists are designing solar-powered cars to replace today's gas-burning cars. Solar, wind, and geothermal (the heat of the Earth's core) energy are being used to produce electricity. Recycling, which was once limited to aluminum and paper, now includes glass, plastics, and other materials.

- **chemical spills** – contamination of ground and/or water with poisonous chemicals that spill from some human-produced source
- **ecosystem** – A group of living and non-living parts that exchange materials and rely on each other for survival
- **energy conservation** – preventing energy waste
- **environmentalist** – person concerned about and willing to take action to protect the natural environment
- **habitat** – place where an organism lives or is most likely to be found
- **interdependence** – The mutual need for each other

  EXAMPLE: Plants feed on nutrients in the soil; the soil in turn is enriched by decaying plants
- **natural resources** – materials supplied by nature that contribute to individual, business, and/or government wealth
- **preservation** – to maintain in an unchanged form
- **renewable resource** – a natural resource that regenerates itself

  EXAMPLES: Trees, animals
- **unchecked consumption** – using resources recklessly-without thinking about the potential costs to the environment

JAPAN AND GARBACOLOGY

When residents of a Japanese fishing village began suffering strange diseases, officials were called in to investigate. Some believed a strange virus had invaded the area. Others thought it was simply coincidence. It wasn't until they discovered that a local factory was discharging mercury into the water that the illnesses could be explained.

Before the source of the pollution was discovered, the fish in the village bay had been poisoned. The villagers ate the fish and were poisoned. The mercury could not be removed, so the Japanese government filled in the entire bay, burying the contamination. Still, hundreds of villagers had suffered the effects: birth defects, paralysis, and death.

The Japanese government and people learned from this sad incident that modern technology must not be allowed to harm the fragile Earth.

Since that time, environmental issues are often Japanese campaign issues. Many Japanese officials have been elected because of their ecological values.

Government programs encourage habits that will protect Japan's land, water, and air. National recycling days are held regularly. On each recycling day a specific material is chosen and citizens are encouraged to bring items for recycling to work or school. These materials are collected and recycled.

Some items are considered highly dangerous. For example, batteries may not be thrown away in Japan, but must be turned in for recycling or proper disposal.

Another program encourages citizens to use bicycles rather than cars. Special storage areas close to stores or businesses are reserved for bicycles. High-rise bicycle storage lots have been constructed in downtown areas and near train stations. Even the trains are high-tech and environment friendly.

Because of Japan's limited land area, even landfills are given special treatment. As landfills are closed, they are carefully covered and landscaped. Plants that will clean the atmosphere around the landfill are carefully manicured. Public buildings and parks are built on the landfill sites. The Japanese are proud of their beautiful landfills.

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HOW LONG DOES IT LAST?

How long does it take litter to decompose? Check out these:

- Aluminum cans and tabs – 80 to 100 years
- Leather – up to 50 years
- Nylon – 30 to 40 years
- Plastic film – 20 to 30 years
- Plastic bags – 10 to 20 years
- Plastic-coated paper containers – 5 years
- Wool socks – 1 to 5 years
- Orange peels – 2 weeks to 5 months

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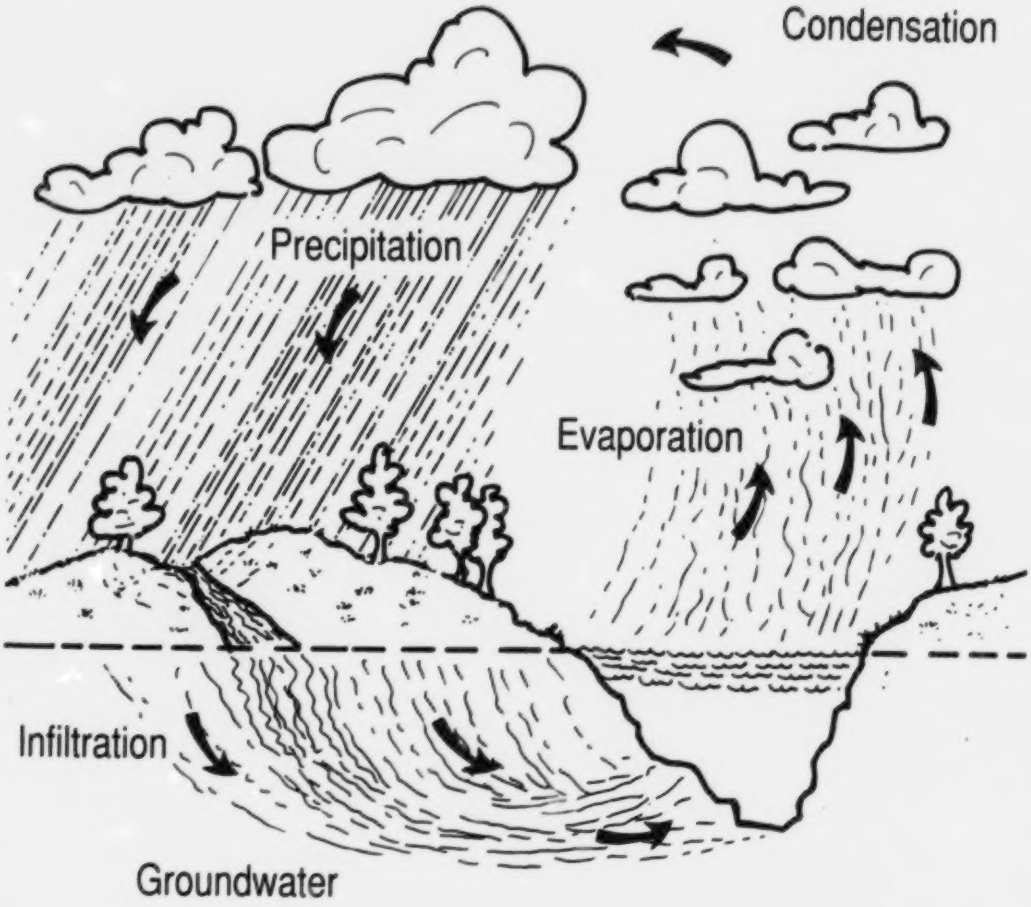
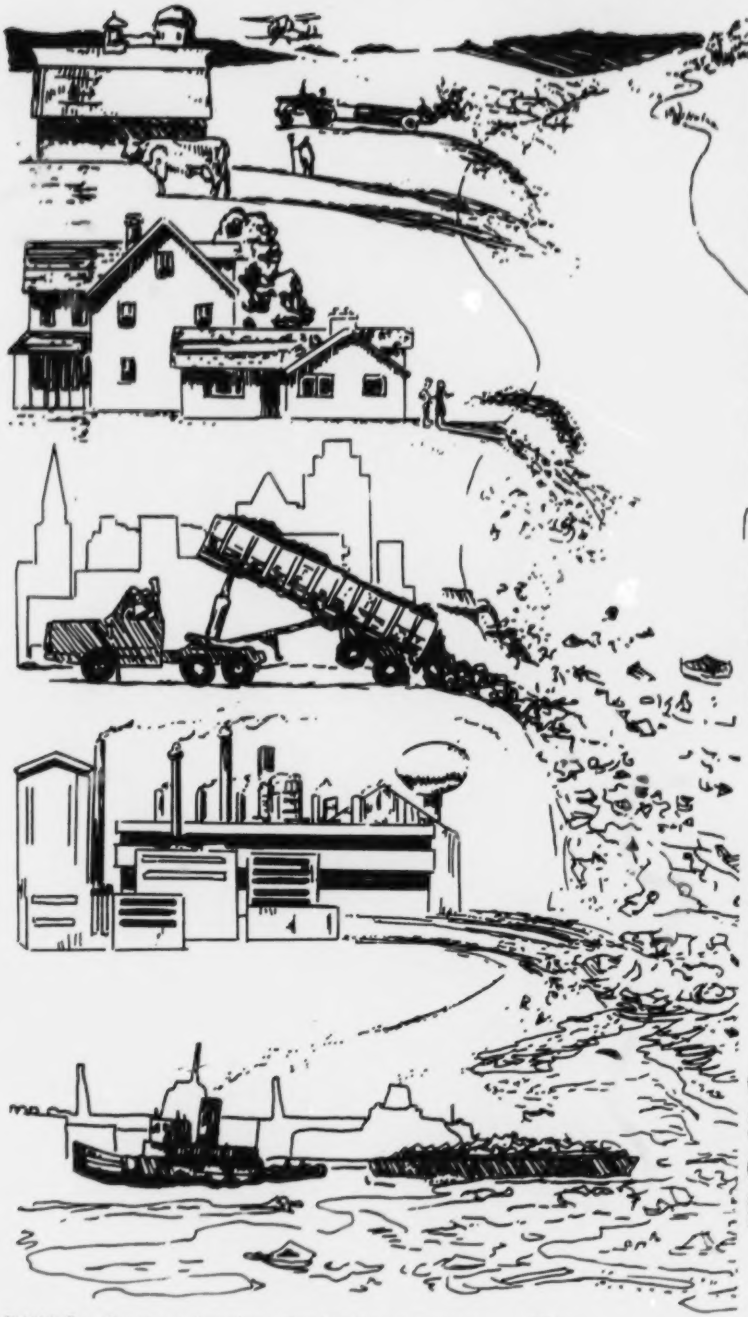
Water Cycle


Condensation
Precipitation
Evaporation
Infiltration
Groundwater

Water Pollutants



Erosion
Animal Wastes
Fertilizer
Insecticides
Feedlot Wastes

Detergents
Sewage
Household Trash
Yard Waste

Garbage
Sewage
Trash
Municipal Wastes

Chemicals
Sludge
Industrial Wastes

Chemicals
Sludge
Oil Spills
Municipal Wastes

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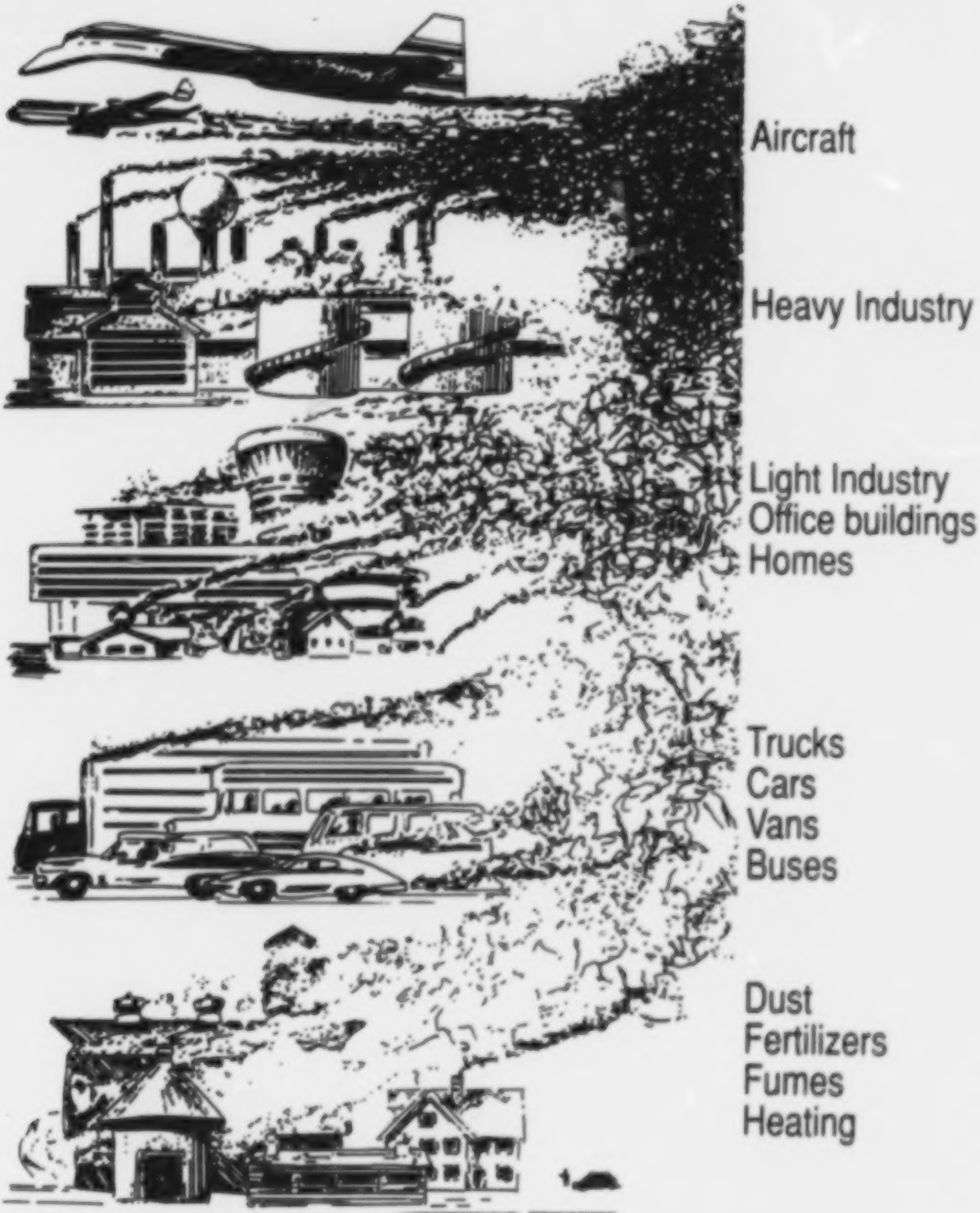
Air Pollutants


Aircraft
Heavy Industry
Light Industry
Office buildings
Homes
Trucks
Cars
Vans
Buses
Dust
Fertilizers
Fumes
Heating

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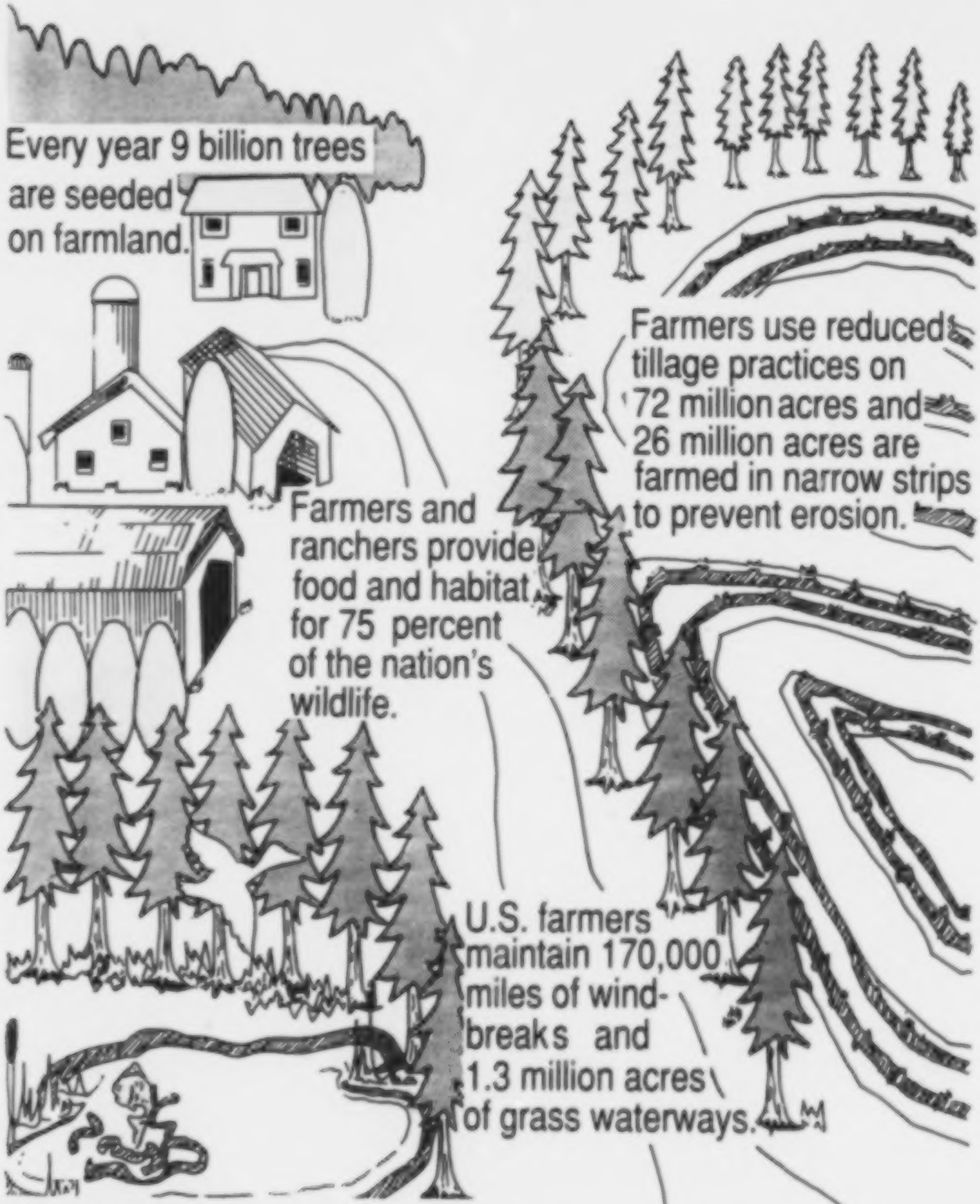
Farmers are Stewards of the Land



Every year 9 billion trees are seeded on farmland.

Farmers use reduced tillage practices on 72 million acres and 26 million acres are farmed in narrow strips to prevent erosion.

Farmers and ranchers provide food and habitat for 75 percent of the nation's wildlife.

U.S. farmers maintain 170,000 miles of windbreaks and 1.3 million acres of grass waterways.

Adapted with permission of American Farm Bureau Federation.

ACTIVITY SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, science, creative thinking/problem solving, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Gaining factual information
- Reacting to written material
- Finding materials in library

WRITING SKILLS

- Using standard grammar, spelling, and capitalization
- Stating ideas clearly
- Using complete sentences

SCIENCE SKILLS

- Investigating physical characteristics of the earth
- Investigating conservation of physical resources
- Investigating conservation of living resources
- Investigating issues of environmental impact

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Identifying critical elements/issues
- Drawing conclusions

- Creating a finished product

SOCIAL STUDIES SKILLS

- Analyzing conservation/ecology issues

- Emphasize to the students that criteria for grading their assignment will include all of the following:
  1. Clarity and accuracy of statement of author's point of view
  2. Support of statement (three sentences, quoted accurately, that support the author's view
  3. Clarity of statement of student's viewpoint
  4. Language skills-correct spelling, punctuation, and grammar and use of complete sentences
- If students have difficulty gaining factual information:
  - Read or examine sources carefully, noting key words and ideas.
  - Suggest they make a list of questions they hope to answer.
- If students have difficulty reacting to written material:
  - Suggest they imagine they are one of the characters in the literature.
  - Remind them to ask themselves, "How would I feel if this were me?"
  - Inform them that the rewards of reading literature come from the life experiences the author brings to the writing and the life experiences the students bring to the reading.
- If students have difficulty finding materials in the library:
  - Review library skills.
  - Examine the layout of the library.
  - Remind them that the librarians can assist them in learning to use the library.

- If students have difficulty using standard grammar, spelling, and capitalization:
  - Review basic grammar skills.
  - Review rules for using capitals.
  - Encourage them to use a dictionary if they are uncertain of the spelling of a word.
- If students have difficulty stating ideas clearly:
  - Instruct them to organize their thoughts before they begin the writing.
  - Remind them to use simple, concise language.
- If students have difficulty using complete sentences:
  - Review the definition of a complete sentence.
  - Review subjects and predicates.
- If students have difficulty investigating physical characteristics of the earth:
  - Discuss the physical characteristics of the earth.
  - Discuss ways that physical characteristics of the earth affect agriculture.
  - Discuss the ways the physical characteristics of the earth affect the lives of the people and animals that live in a certain locale.
- If students have difficulty investigating conservation of physical resources:
  - Define and list resources.
  - Discuss why the physical resources are important.
  - Discuss ways of conserving the physical resources.
- If students have difficulty investigating conservation of living resources:
  - Define and list living resources.
  - Discuss why living resources are important.
  - Discuss ways of conserving living resources.

- If students have difficulty investigating issues of environmental impact:
  - Discuss the fact that people have differing opinions on environmental issues.
  - Stress the importance of investigating different viewpoints on a single issue.
- If students have difficulty identifying critical elements/issues:
  - Examine the information carefully, noting the main ideas.
  - Remind them to watch for clue words.

    EXAMPLE: "The two major points are...."
- If students have difficulty drawing conclusions:
  - Suggest they examine their sources to reveal the author's viewpoint.
  - Suggest they analyze the actions of the characters to determine the author's opinion on an issue.
- If students have difficulty creating a finished product:
  - Review the information.
  - Instruct them to examine the goals of the assignment.
  - Instruct them to work one step at a time until the project is finished.
- If students have difficulty analyzing conservation/ecology issues:
  - Remind them that to analyze they must break the issue down into all its component parts and examine each one.
  - Discuss the consequences of ignoring conservation/ecology issues.

Reading Comprehension Skills
- Gain factual information
- React to written material

Research and Reference Skills
- Find materials in library

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Composition Skills
- Use complete sentences

Earth Science Skills
- Investigate physical characteristics of the earth
- Investigate conservation of physical resources
- Investigate conservation of living resources
- Investigate issues of environmental impact

ECOLOGY AND LITERATURE

Because man has always relied on nature, he has included nature in art and literature. Perhaps no other theme (except love) is used more often.

Choose one of the pieces listed below. Check it out from your school or local library. Read it and decide what the author is trying to say about nature and conservation. Write a one-sentence description of the author's point of view and then list three sentences in what you read that support the author's view. Finally, write a sentence describing your own views and why you agree or disagree with the author.

- "The Green Morning," a short story included in *The Martian Chronicles* by Ray Bradbury
- "To Build a Fire" by Jack London
- "The Big Two-Hearted River" by Earnest Hemingway
- "Song of a Redwood" by Walt Whitman
- *The Giving Tree* by Shel Silverstein
- "In Praise of Science and Technology" from *Broca's Brain* by Carl Sagan (notice that this book was first published in 1974 — ten years before the hole in the ozone layer was discovered)
- Chapter 1 of *Cry, the Beloved Country* by Alan Paton
- "The Pond in Winter" from *Walden* by Henry David Thoreau
- "Memories of the American Chestnut" from *Foxfire 6*
- "The Offering of the Pipe" from *Black Elk Speaks* by John Neihardt
- "Flambeau" from *The Sand County Almanac*, by Aldo Leopold
- "Crossings" or "In Kit Form: The Cottonwood Chapter" in *Prairyerth* by William Least Heat Moon
- "The Desert" in *Blue Highways* by William Least Heat Moon

Cognitive Activities Skills

- Identify critical elements/issues
- Draw conclusions
- Create a finished product

Functional Social Studies Skills

- Analyze conservation/ ecology issues

- "The River and its History" from *Life on the Mississippi* by Mark Twain
- *On the Loose* by Terry and Renny Russell
- *The Lorax* by Dr. Seuss
- "Earth's Green Mantle" from *Silent Spring* by Rachel Carson

SUGGESTED EVALUATIVE CRITERIA

1.	Clarity and accuracy of statement of author's point of view	30 points
2.	Support of statement (three sentences, quoted accurately, that support the author's view)	30 points
3.	Clarity of statement of student's viewpoint	30 points
4.	Language skills–correct spelling, punctuation, and grammar. Use of complete sentences	10 points
	TOTAL	100 points

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
SCIENCE SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, science, oral communication, interpersonal or relating, creative thinking/problem solving, employability, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Gaining factual information
- Selecting useful resources
- Locating resources

WRITING SKILLS

- Stating ideas clearly
- Taking notes

SCIENCE SKILLS

- Investigating conservation of physical resources
- Investigating conservation of living resources
- Investigating issues of environmental impact

ORAL COMMUNICATION SKILLS

- Making persuasive presentations
- Presenting personal opinion/viewpoint
- Applying active listening skills

- Working effectively in a group

INTERPERSONAL OR RELATING SKILLS

- Participating in group activities
- Presenting point of view
- Persuading others

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues
- Defining a problem
- Analyzing/synthesizing information
- Drawing conclusions
- Creating a finished product

SOCIAL STUDIES SKILLS

- Collecting/recording data
- Analyzing conservation/ecology issues
- Analyzing social impact of science/technology
- Analyzing economic impact of science/technology

- Emphasize to the students that criteria for grading their assignment will include all of the following:
  1. Meets time and presentation guidelines set by teacher;
  2. Constructive speech presents the main arguments; arguments supported by evidence;
  3. Rebuttal speech refutes opponents arguments; rebuttal supported by evidence;
  4. Presents evidence of careful, thorough research.

813

- If students have difficulty gaining, collecting, or recording factual information or data:
  - Suggest they examine their sources, noting key words and ideas.
  - Suggest they make a list of the questions they hope to answer.
  - Stress the importance of factual evidence in debate.
- If students have difficulty selecting useful resources:
  - Discuss various resources that are available to them.
  - Have them examine the reference section of the library.
- If students have difficulty locating resources:
  - Discuss different ways of obtaining the specific information.
  - Provide examples of resources in the specific and related areas.
  - Invite a librarian to discuss available resources and how to use them.
  - Review library skills.
  - Remind them that the librarian is able to assist them in learning to use the library.
- If students have difficulty stating ideas clearly:
  - Remind them to use simple, concise language.
  - Instruct them to organize their thoughts before they begin writing.
- If students have difficulty taking notes:
  - Instruct them to review the information on taking notes in the "Record Keeping" unit.
  - Remind them that note taking is a skill that improves with practice.
  - Discuss the importance of taking accurate notes.

  - Explain that the rebuttal phase of a debate is not a practiced speech, but an extemporaneous speech with their notes as their only resource.
  - Review listening skills.
  - Remind them to take notes quickly, omitting words or phrases that are non-essential.
  - Remind them to note every word of a direct quotation.

- If students have difficulty making informative presentations:
  - Review oral communication skills.
  - Define the goal or purpose of the speech.
  - Stress the importance of supporting their statements with factual evidence.
  - Remind them that debate is a formal communication that requires an opening (constructive) speech that presents their main arguments.
  - Inform them that constructive speeches are prepared and rehearsed in advance of the actual debate.
  - Remind them that debate is a formal communication that requires a closing (rebuttal) speech that is extemporaneous and based on notes taken during the debate.
  - Remind them that the purpose of the rebuttal is to refute the opponent's arguments.

    EXAMPLE: The opponent's evidence is not sufficient.
    The opponent's evidence is not accurate.
    The opponent's source is not reliable.
    The opponent's conclusion is not logical.

- If students have difficulty making persuasive presentations:
  - Review oral communication skills.
  - Define the goal or purpose of the speech.
  - Explain that the basis of debate is to persuade the audience to accept their viewpoint.

- Explain that emotion-provoking words can aid in persuading others.

  EXAMPLE: Instead of "John Smith is a good citizen," use "John Smith is a patriotic American."

- Remind them that their statements must be supported by facts.

- If students have difficulty presenting personal opinions/viewpoints:
  - Discuss the difference between fact and opinion.
  - Discuss the importance of providing information to support their opinions.
  - Discuss the importance of investigating their opinions and feelings.
- If students have difficulty applying active listening skills:
  - Encourage them to familiarize themselves with background information before the communication begins.
  - Suggest they be ready before beginning the communication.
  - Stress the importance of focusing on the speaker.
  - Remind them that maintaining eye contact enhances listening ability.
- If students have difficulty participating or working effectively in a group:
  - Discuss the goals of the group.
  - Define each student's responsibilities within the group.
- If students have difficulty defining a problem:
  - Review the available information.
  - Discuss the critical elements/issues.
- If students have difficulty analyzing/synthesizing information:
  - Remind them that to analyze they must examine all the component parts of the information.

  - Remind them that to synthesize they must reassemble the component parts in a form that makes the information clear and usable.

- If students have difficulty analyzing social impact of science/technology:

  - Discuss ways that science/technology has impacted society.

- If students have difficulty analyzing economic impact of science/ technology:

  - Discuss ways that science/technology has impacted the economy.

  - Suggest they research the impact to determine how great the economic impact can be.

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 1

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

Name ____________________ Score __________

OBJECTIVE 5 **Debate a current ecological concern.**

INTRODUCTION

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Select useful resources
- Locate resources

Protecting our environment is important, but policies have to balance the need to protect Earth with other concerns. For example, if an industrial plant is polluting, closing the plant will protect the environment but will also put employees out of work. Halting clearcutting in the rain forests will benefit the world, but could also cause widespread starvation among the small farmers. Using pesticides protects crops, but can contaminate water. Growth hormones make cattle larger and stronger and increase milk production, but may remain in the milk and affect consumers' health. Using cloth diapers rather than disposable would cut landfill waste, but washing the diapers would add detergents to the water systems. Knowing what to do can be difficult.

DIRECTIONS

Language Skills
- State ideas clearly

Research Skills
- Take notes

Earth Science Skills
- Investigate conservation of physical resources
- Investigate conservation of living resources
- Investigate issues of environmental impact

With your three debate partners, choose an ecological issue affecting your community or one of the topics below. Decide which two of you will debate in favor of the proposal and which two of you will debate against it. Research your topic and debate your position according to the rules set by your instructor.

Possible topics:

- A factory in your community can add a scrubber smokestack, greatly reducing air pollution. As a result, 200 workers will lose their jobs. Should the scrubber be added?
- A large metropolitan area wants to truck garbage to your local landfill. The city will make a lot of money – enough to cut local sales taxes; however, the landfill will have to be expanded to approximately five times its local size immediately, and even more space will be needed within five years. Should the landfill accept the garbage?
- A large metropolitan area wants to convert its sewage to sludge and spray it on area farms for fertilizers. Officials and farmers supporting the program say the sludge is safe, but opponents and environmentalists say the sewage can't be completely checked and may contain industrial waste and poisonous heavy metals. Should the sludge be used?

Oral Presentation Skills
- Make persuasive presentations
- Present personal opinion/viewpoint

Listening Skills
- Apply active listening skills

Interactive Communication Skills
- Work effectively in a group

General Relating Skills
- Participate in group activities

Teamwork/ Cooperative Skills
- Present point of view

Leadership/ Influencing Skills
- Persuade others

Cognitive Activities Skills
- Collect/record information
- Identify critical elements/issues
- Define a problem
- Analyze/synthesize information
- Draw conclusions
- Create a finished product

Information Analysis Skills
- Collect/record data

Functional Social Studies Skills
- Analyze conservation/ ecology issues
- Analyze social impact of science/technology
- Analyze economic impact of science/technology

- A nuclear power plant has been proposed near your community. Those supporting the plant say the new equipment will be state-of-the-art–the safest ever. They also say electricity will be supplied for many years at a very low price and that thousands of jobs will be created. They also point out that if the electricity is not produced at the nuclear power plant, a coal-burning plant will be necessary. A coal-burning plant will cause serious air pollution. Those opposing the nuclear power plant say that the dangers outweigh any benefit. They believe that the threat of a possible meltdown or contamination is too great to risk and that the nuclear power plant would have no safe place to dispose of contaminated water and other toxic byproducts. Should the nuclear power plant be built?

- A nuclear waste site has been proposed near your town. Those wanting to build the site promise the underground burial chamber will be strong enough to prevent any leakage for 5,000 years. Those opposed to the waste site claim that it is impossible to promise any construction will last 5,000 years. They are especially worried about ground water contamination. Should the nuclear waste site be constructed?

SUGGESTED EVALUATIVE CRITERIA

1.	Meets time and presentation guidelines set by teacher	25 points
2.	Constructive speech presents the main arguments. Arguments supported by evidence.	25 points
3.	Rebuttal speech refutes opponents arguments. Rebuttal supported by evidence.	25 points
4.	Presents evidence of careful, thorough research.	25 points
	TOTAL	100 points

S10

ASSIGNMENT SHEET 2

Development of:
MATHEMATICS SKILLS
SCIENCE SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why mathematics, science, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Calculating with decimals
  - Solving word problems
  - Solving percent problems
  - Interpreting statistics

  SCIENCE SKILLS

  - Investigating physical characteristics of the earth

  SOCIAL STUDIES SKILLS

  - Interpret statistical information

- If students have difficulty calculating with whole numbers:
  - Review basic skills in addition, subtraction, multiplication, and division.
  - Remind them to check their work for accuracy.
- If students have difficulty calculating with decimals:
  - Explain that the decimal system is based on groups of ten.
  - Remind them that our money system is a decimal money system.

  - Review addition, subtraction, multiplication, and division skills using decimals.

- If students have difficulty solving word problems:
  - Remind them to read the information carefully in order to define the problem.
  - Review mathematical terminology.

    EXAMPLE: To "compare" two numbers they must subtract.

- If students have difficulty solving percent problems:
  - Inform them that the symbol "%" or the word percent means "per hundred."
  - Explain that to figure 12% of an amount is another way of saying 12/l00 of that amount, or 12 from each group of 100.
  - Remind them that our dollar is a good example of a percentage system: 37% of a dollar is 37/100 of a dollar or $.37.

- If students have difficulty interpreting statistics or statistical information:
  - Stress the importance of statistics in defining size and scope.
  - Remind them to read carefully, noting the key ideas.
  - Explain to them that by studying statistical information from the past they can make an educated guess about the future.

- For additional suggestions on teaching basic skills, refer to Instructional Supplement 1.

ASSIGNMENT SHEET 2

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

Name ______________________________ Score ____________

OBJECTIVE 6

Calculate the amount of usable water on Earth.

INTRODUCTION

Water goes through a complicated cycle of evaporation and precipitation. During the cycle, a drop of water may be part of a soft drink, evaporate from a sweaty forehead, fall to earth during a snowstorm, be absorbed by a blade of grass, and, after the blade of grass is eaten by a dog, be released as part of the moisture in the dog's breath. The drop could just as easily spend centuries locked in the depths of the ocean or in a glacier.

While there are almost limitless possibilities, the actual amount of water on Earth doesn't change.

DIRECTIONS

Assume the Earth really was the size of a globe. If it was that size, the Earth and its atmosphere would hold about five gallons of water. Use the information below to answer the questions.

- Oceans hold 97.2% of the Earth's water.
- Icecaps and glaciers hold 2% of the Earth's water.
- 0.62% of the Earth's water is ground water.
- 0.009% of the Earth's water is in freshwater lakes.
- Inland seas and saltwater lakes hold 0.008% of Earth's water.
- 0.001% of the Earth's water is in the atmosphere.
- Rivers hold only 0.0001% of the Earth's water.
- Icecaps, glaciers, and ground water are not considered usable fresh water.
- Oceans, inland seas, and saltwater lakes are not fresh water.
- Water in the atmosphere is not considered usable.
- 5 gallons = 1,280 Tablespoons

Operation and Calculation Skills
- Caluculate with whole numbers
- Caluculate with decimals

Math Application Skills
- Solve word problems
- Solve percent problems

Data Analysis and Display Skills
- Interpret statistics

Earth Science Skills
- Investigate physical characteristics of the earth

Information Analysis Skills

- Interpret statistical information

Remember these rules when solving the problems:

- Percentages can be added (2% + 2% = 4%)
- To multiply something by a percentage, change the percentage to a decimal by moving two spaces to the left (10% = .10, .001% = .00001)
- To multiply something by a decimal, pretend the decimal isn't there, multiply normally, then count the number of digits to the right of the decimal in the problem. The same number of digits should be to the right of the decimal point in your answer. Convert your answer to a percentage by moving the decimal back to the right two digits.

47
X .3 (1 digit)
141 = 14.1 = 1410%

1240
X .10 (2 digits)
0000
+ 1240
12400 = 124.00 = 12400%

.001 (3 digits)
X 32
002
+ 003
0032 = 0.032 = 3.2%

1. What percentage of the Earth's water is usable, fresh water?
   ____

2. If all the Earth's water = 5 gallons, how many tablespoons of water would be:
   a. usable, fresh water?____________
   b. in the oceans? ____________
   c. in the atmosphere? ____________
   d. ground water? ____________

ASSIGNMENT SHEET 1

Debates should meet time and presentation guidelines, should present reasonable, factual information in an appropriate manner, and show evidence of appropriate research.

ASSIGNMENT SHEET 2

1. 0.0091%
2. a. 11648
   b. 1244.16
   c. 0.0128
   d. 7.936

JOB SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, science, employability, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Interpreting forms and records
- Following written instructions

WRITING SKILLS

- Stating ideas clearly
- Completing forms and records

SCIENCE SKILLS

- Applying scientific method of inquiry
- Investigating forms/changes of matter
- Investigating forms/changes of energy
- Investigating issues of environmental impact.
- Applying science principles to environmental issues

EMPLOYABILITY SKILLS

- Practicing good work habits/attitudes

SOCIAL STUDIES SKILLS

- Collecting/recording data
- Constructing graphical information
- Analyzing conservation/ecology issues

- If students have difficulty interpreting forms and records, examine the structure of the forms being used.
- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty completing forms and records:
  - Examine the structure of the forms being used.
  - Review the information.
- If students have difficulty applying scientific method of inquiry:
  - Remind them to start with a hypothesis (what they believe will happen).

    EXAMPLE: The hypothesis is that various substances will decompose at varying rates.
  - Inform them that scientific facts can be demonstrated repeatedly with the same basic results.

    EXAMPLE: The orange peel should always decompose more quickly than plastic.
- If students have difficulty investigating forms/changes of matter:
  - Suggest they retain a sample of the original matter to compare to the end product.
  - Discuss some of the changes that may be expected.
- If students have difficulty investigating forms/changes of energy:
  - Discuss some of the changes that may be expected.

  - Discuss different forms of energy.

- If students have difficulty practicing good work habits/attitudes:
  - Make sure the students understand what is expected of them.
  - Stress the importance of good work habits/attitudes in obtaining and retaining employment.

- If students have difficulty constructing graphical information:
  - Review the construction of charts and graphs.
  - Discuss what information is contained in the chart.
  - Remind them that a chart is a visual record of information.

- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1 and 2.

OBJECTIVE 7 **Observe biodegradability in a compost pile.**

INTRODUCTION

Composting is not a new technology, but it is being used to solve many of today's environmental problems. Composting is a method of waste disposal in which organic matter is broken down into simple compounds. As matter decomposes, methane gas is released.

In some composting programs, usually called *biomass* programs, the methane gas is trapped and used as a power source. The methane gas powers generators that produce electricity. These programs are being used in many developing nations around the world. Animal waste, wood, straw, and other wastes are collected and fuel the system.

In the United States, composting is being used to solve a growing waste disposal problem. America is running out of safe waste disposal sites. Landfills, offshore garbage dumping, and other waste disposal methods used in the past are now known to cause environmental problems. As a result, there are fewer places to dispose of garbage. When organic matter is separated from inorganic matter and composted, rich humus is produced and less garbage must be sent to disposal sites.

Student Supplement 3 contains a list of items and how long they take to decompose. Look through the materials you will be composting. Select some of these items you will be able to observe, such as orange or banana peels. You will be observing and recording their condition as they decompose.

EQUIPMENT AND SUPPLIES

- Chicken wire or hardware cloth 11' x 4'
- Wire or twine
- Wire snips or scissors
- Pliers
- 2 wooden or metal stakes, 5' long
- Composting material
- Decomposition test materials
- Water
- Plastic tarp
- Pitchfork or rake
- Pencil or pen
- Paper

PROCEDURE

1. Use the wire or twine to tie the chicken wire or hardware cloth into a circle.
2. Push the two stakes into the ground.
3. Wire or tie the fence circle to the posts.
4. Fill the compost pile with layers of composting material. Water each layer until it is about as wet as a damp sponge.
5. Place test items in the compost pile. List each test item and keep your list for later use.
6. Cover the compost pile with the tarp.
7. Once a month, untie the fence from the stakes, remove the stakes and pull the fence away from the compost. Set the bin back up next to the compost pile and shovel the compost back into the bin. Add water, as needed. Check each of the test items and write their condition on your list.
8. Have your instructor check your work.
9. Put tools and materials away and clean your work area.

Functional Reading Skills
- Interpret forms and records
- Follow written instructions

Language Skills
- State ideas clearly

Functional Writing Skills
- Complete forms & records

General Science Skills
- Apply scientific method of inquiry

Physical Science Skills
- Investigate forms/changes of matter
- Investigate forms/changes of energy

Earth Science Skills
- Investigate issues of environmental impact
- Apply science principles to environmental issues

Job Acquisition/ Development Skills
- Practice good work habits/attitudes

Item	Condition				
	Month 1	Month 2	Month 3	Month 4	Month 5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					

COMMENTS AND OBSERVATIONS

Information Analysis Skills

- Collect/record data
- Construct graphical information

Functional Social Studies Skills

- Analyze conservation/ ecology issues

JOB SHEET 2

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, science, employability, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Interpreting forms and records
- Following written instructions
- Interpreting graphics and symbols

WRITING SKILLS

- Stating ideas clearly
- Completing forms and records

MATHEMATICS SKILLS

- Using English and metric measures
- Collecting/recording data
- Making measurements

SCIENCE SKILLS

- Applying scientific method of inquiry
- Using scientific instruments (microscope)
- Collecting specimens

- Investigating forms/changes of matter
- Investigating issues of environmental impact
- Applying science principles to environmental issues

EMPLOYABILITY SKILLS

- Practicing good work habits/attitudes

SOCIAL STUDIES SKILLS

- Collecting/recording data
- Constructing graphical information
- Analyzing conservation/ecology issues

- If students have difficulty interpreting graphics and symbols:
  - Discuss the information contained in the chart.
  - Examine the structure of the chart.
- If students have difficulty using English and metric measures or making measurements:
  - Review the English and metric systems of measurement.
  - Determine which system is being used on the available equipment and demonstrate its use.
- If students have difficulty collecting/recording data:
  - Discuss the importance of recording data precisely.
  - Examine the forms to determine which data should be recorded.
- If students have difficulty using scientific instruments (microscope):
  - Explain the purpose of the instrument.
  - Demonstrate the use of the instrument.
- If students have difficulty collecting specimens:
  - Review procedure for collecting samples.

- Explain the necessity for keeping samples separate and labeled, and uncontaminated.
- Allow students to practice collecting samples before completing the job sheet.

- For additional suggestions on teaching basic skills refer to Instructional Supplements 1, 2, and 4.

OBJECTIVE 8 **Compare growth in various types of water.**

INTRODUCTION

Nice, clear water may be best for drinking and swimming, but the environment also needs darker, life-filled water. Ponds and lakes are filled with plants and animals, many of which are microscopic. Without these small living organisms, larger plants and animals cannot survive.

EQUIPMENT AND SUPPLIES

- Seven 1-quart glass jars
- Masking tape
- Marking pens
- 1 gallon distilled water
- Tap water
- Household plant fertilizer
- 1 roll aluminum foil
- 1 gallon pond water (pond water must be freshly gathered)
- Microscopes
- Eye dropper or straw

PROCEDURE

1. Using masking tape and a marking pen, label the seven quart jars with the following:
   - Control
   - Distilled water
   - Tap water
   - Pond water
   - Fertilizer
   - 10_x fertilizer
   - 20_x fertilizer
2. Fill the jars as follows:

   NOTE: Stir the pond water before measuring it and adding it to the jars.

   - Control jar – 3 cups distilled water
   - Distilled water – 3 cups distilled water plus ½ cup pond water
   - Tap water – 3 cups tap water plus ½ cup pond water
   - Pond water – 3 ½ cups pond water
   - Fertilizer – 3 cups distilled water, ½ cup pond water, fertilizer to concentration recommended by manufacturer

Functional Reading Skills
- Interpret forms and records
- Follow written instructions
- Interpret graphics & symbols

Language Skills
- State ideas clearly

Functional Writing Skills
- Complete forms & records

- 10_x fertilizer – 3 cups distilled water, ½ cup pond water, 10 times the recommended fertilizer concentration
- 20_x fertilizer – 3 cups distilled water, ½ cup pond water, 20 times the recommended fertilizer concentration

3. Loosely cover each jar with a piece of aluminum foil.

4. Place the jars in a cool, well-lit area, out of direct sunlight.

5. Complete the chart on the following page, checking the jars each week and adding a brief description of their appearance. Check for changes in color and clarity, anything growing in the water, or any other change you notice. If microscopes are available, take a sample each week, and count the number of organisms you see.

6. On the chart, circle the name of the type of water which showed the greatest amount of growth.

7. Have your instructor check your work.

8. Put tools and materials away and clean your work area.

Math Application Skills
- Use English & metric measures

Data Analysis and Display Skills
- Collect/record data

Functional Math Skills
- Make measurements

General Science Skills
- Apply scientific method of inquiry
- Use scientific instruments (microscope)
- Collect specimens

Physical Science Skills
- Investigate forms/changes of matter

Earth Science Skills
- Investigate issues of environmental impact
- Apply science principles to environmental issues

Job Acquisition/ Development Skills
- Practice good work habits/attitudes

Information Analysis Skills
- Collect/record data
- Construct graphical information

Functional Social Studies Skills
- Analyze conservation/ ecology issues

	When mixed	Week 1	Week 2	Week 3	Week 4
Control					
Distilled water					
Tap water					
Pond water					
Fertilizer					
10_x Fertilizer					
20_x Fertilizer					

COMMENTS AND OBSERVATIONS

JOB SHEET 3

Development of:
READING SKILLS
WRITING SKILLS
SCIENCE SKILLS
EMPLOYABILITY SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, science, employability, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Following written instructions

WRITING SKILLS

- Stating ideas clearly
- Taking notes
- Completing forms and records

SCIENCE SKILLS

- Applying computing skills
- Applying scientific method of inquiry
- Conducting experiments
- Investigating conservation of living resources
- Investigating issues of environmental impact
- Applying science principles to environmental issues

EMPLOYABILITY SKILLS

- Practicing good work habits/attitudes

SOCIAL STUDIES SKILLS

- Collecting/recording data
- Constructing graphical information
- Analyzing conservation/ecology issues

- If students have difficulty conducting experiments:
  - Define the problem.
  - Review the instructions.
  - Remind them to start with a hypothesis or statement of what they intend to prove.
  - Remind them that scientific facts can be proven by repeating the experiments and obtaining the same results each time.
- For additional suggestions on teaching basic skills refer to Instructional Supplements 1, 2, and 4.

OBJECTIVE 9

Test the effects of acid rain on agriculture.

INTRODUCTION

Acid rain affects people, animals, structures, and water sources. But how does it affect agriculture? In this assignment, you will use vinegar to recreate acid rain. Vinegar is not the same as sulfuric acid found in acid rain, but it is similar.

EQUIPMENT AND SUPPLIES

- Two flats of seedlings
- Two mist sprayers
- Vinegar
- Tap water
- Masking tape
- Marking pen

PROCEDURE

1. Fill one mist sprayer with water; the other with vinegar.
2. Compare the seedlings in the two trays. Note any differences on the chart.
3. Using the masking tape and marking pen, label each tray. Label one "water" and the other "vinegar."
4. Water the seedlings in the "water tray" by spraying them with water.
5. Water the seedlings in the "vinegar tray" by spraying them with vinegar.
6. Place the trays in a warm, well-lit area.
7. Continue to care for the plants by spraying the water tray with water and the vinegar tray with vinegar.
8. Check the progress of the plants in each tray daily. Note your findings on the chart.
9. Have your instructor check your work.
10. Put tools and materials away and clean your work area.

Functional Reading Skills
- Follow written instructions

Language Skills
- State ideas clearly

Research Skills
- Take notes

Functional Writing Skills
- Complete forms & records

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Water tray						
Vinegar tray						

COMMENTS AND OBSERVATIONS

General Science Skills

- Apply computing skills
- Apply scientific method of inquiry

Earth Science Skills

- Investigate conservation of living resources
- Investigate issues of environmental impact
- Apply science pri em issues

Job Acquisition/ Development Skills

- Practice good work habits/attitudes

Information Analysis Skills

- Collect/record data
- Construct graphical information

Functional Social Studies Skills

- Analyze conservation/ ecology issues

PRACTICAL TEST 1

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

JOB SHEET 1

Observe biodegradability in a compost pile.

Student's name ________________ Date ________

Evaluator's name ________________ Attempt no. ____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Used wire or twine to tie the chicken wire or hardware cloth into a circle	___	___
2. Pushed two stakes into the ground	___	___
3. Wired or tied the fence circle to the posts	___	___
4. Filled the compost pile with layers of composting material	___	___
5. Watered each layer until it was about as wet as a damp sponge	___	___
6. Placed test items in the compost pile	___	___
7. Listed each test item and kept list for later use	___	___
8. Covered the compost pile with a tarp	___	___

9. Once a month, untied the fence from the stakes, removed the stakes and pulled the fence away from the compost ____ ____

10. Set the bin back up next to the compost pile and shoveled the compost back into the bin ____ ____

11. Added water, as needed ____ ____

12. Checked each of the test items and wrote down their condition ____ ____

13. Used proper tools correctly

14. Performed steps in a timely manner ____ ____

15. Practiced safety rules throughout procedure ____ ____

16. Provided satisfactory responses to questions asked ____ ____

17. Put tools away and cleaned work area ____ ____

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1

Completed task	4	3	2	1
Kept accurate records	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 2

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

JOB SHEET 2

Compare growth in various types of water.

Student's name ____________________ Date __________

Evaluator's name ____________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Labeled seven quart jars	___	___
2. Filled the jars as instructed	___	___
3. Loosely covered each jar with a piece of aluminum foil	___	___
4. Placed the jars in a cool, well-lit area, out of direct sunlight	___	___
5. Completed the form, checked the water each week and added a brief description of the appearance	___	___
6. Circled the type of water which showed the greatest amount of growth	___	___
7. Used proper tools correctly	___	___
8. Performed steps in a timely manner	___	___
9. Provided satisfactory responses to questions asked	___	___
10. Put tools away and cleaned work area	___	___

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed task	4	3	2	1
Kept accurate records	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

PRACTICAL TEST 3

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

JOB SHEET 3

Test the effects of acid rain on agriculture.

Student's name ______________________ Date __________

Evaluator's name ______________________ Attempt no. _____

Instructions: When you are ready to perform this task ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

Evaluator note: Write a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.

The student:	Yes	No
1. Filled one mist sprayer with water and the other with vinegar	___	___
2. Compared the seedlings in the two trays, noting any differences on the chart	___	___
3. Labeled one tray "water" and the other "vinegar"	___	___
4. Watered the seedlings in the water tray by spraying with water	___	___
5. Watered the seedlings in the vinegar tray by spraying with vinegar	___	___
6. Placed the trays in a warm, well-lit area	___	___
7. Continued to care for the plants by spraying with water and vinegar	___	___
8. Checked the progress of the plants in each tray, noting findings on the chart	___	___

9. Used proper tools correctly ___ ___

10. Performed steps in a timely manner ___ ___

11. Practiced safety rules throughout procedure ___ ___

12. Provided satisfactory responses to questions asked ___ ___

13. Put tools away and cleaned work area ___ ___

EVALUATOR'S COMMENTS

___

___

___

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed task	4	3	2	1
Kept accurate records	4	3	2	1

EVALUATOR'S COMMENTS

___

___

___

AVERAGE RATING

Evaluator note: To obtain an average rating for the competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** - Can perform job with no additional training
3 **Moderately Skilled** - Has performed job during training program; limited additional training may be required
2 **Limited Skill** - Has performed job during training program; additional training is required to develop skill
1 **Unskilled** - Is familiar with process, but is unable to perform job

WRITTEN TEST

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with agricultural ecology and the environment to their definitions. Write the correct letter in the blank.

Part I

____ 1. Wearing away

____ 2. A method of waste disposal in which waste materials are broken down into simple compounds and used as humus

____ 3. Acidic precipitation caused by air pollution; can harm and/or kill land and aquatic plants, aquatic insects, and fish; can erode man-made structures as well as rock and stone.

____ 4. Naturally-occurring underground water systems

____ 5. Plant and animal material; living material

____ 6. The ability of a substance to be broken down into simple compounds such as carbon or water

____ 7. To reuse

a. acid rain
b. decompose
c. biodegradability
d. air pollution
e. erosion
f. sterilization
g. renewable resource
h. recycle
i. ground water
j. composting
k. ecosystem
l. organic

May be photocopied for student use.

Part II

_____ 1. An environment in which all items needed by living things within the environment are produced by the environment or other living things within it

_____ 2. Removal of pollutants

_____ 3. Not living

_____ 4. Containing impurities

_____ 5. Naturally occurring, thin shield of gas in the earth's stratosphere that protects the earth from the sun's dangerous ultraviolet radiation

_____ 6. Natural surroundings

_____ 7. Contamination of the environment with harmful substances

_____ 8. Warming of the earth caused by naturally-occurring gases and emission of human-caused gases

_____ 9. Study of living organisms and how they relate to one another and their environment

_____ 10. Protecting from loss or depletion

a. contamination

b. chemical spills

c. inorganic

d. ecology

e. global warming

f. location

g. oncology

h. biosphere

i. conservation

j. stratosphere

k. ozone layer

l. pollution

m. environment

n. purification

May be photocopied for student use.

OBJECTIVE 2

Select from a list true statements about water conservation and purification. Write an "X" in the blank before each true statement.

______ 1. The importance of clean water has been understood for centuries.

______ 2. Most of the water used, is used for personal care, such as drinking and bathing.

______ 3. Water underground is hard to pollute.

______ 4. Chlorine is used to purify water.

______ 5. 70 percent of the water used in the world, is used for irrigation.

______ 6. We are just learning the importance of clean water.

______ 7. One third of the crops raised in the world come from the 17 percent of farmland that is irrigated.

______ 8. In some cases, contamination can best be removed by adding microbes (microscopic animals) to the water.

______ 9. Protecting our water supply is important both to daily life and to agriculture.

______ 10. Less than 10 percent of the crops raised in the world come from irrigated farmland.

______ 11. In nature, water is purified by the natural "cleansers" that fall into the water.

______ 12. Water underground can be contaminated by landfills and other buried waste.

______ 13. Air pollutants are found in rain.

______ 14. In nature, water purifies itself simply by flowing a short distance.

______ 15. Today purification is usually done by changing the temperature of the water, then removing the top and bottom layers of water.

______ 16. Water is always easy to purify.

May be photocopied for student use.

____ 17. Oklahoma, along with six other states, is affected by the Ogalala Aquifer.

____ 18. The aquifer has benefitted from agriculture.

____ 19. On space flights, water is collected from the atmosphere outside the space crafts.

____ 20. The Ogalala Aquifer has been damaged by the cattle and farming industries.

OBJECTIVE 3

State effects of polluted air on people, structures, and agriculture. List ten effects of polluted air.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

OBJECTIVE 4

Choose the word or phrase that completes statements about technology and the environment. Write the correct letter in the blank.

____ 1. Tall "scrubbers" are smokestacks that

a. remove pollutants before gases are released
b. prevent pollutants from entering the environment
c. replace technology with safer methods or products
d. make the same pollutants less dangerous

May be photocopied for student use.

_____ 2. No-till farming decreases soil

a. contamination
b. biodegradability
c. renewal
d. erosion

_____ 3. Wind, solar, and geothermal power are being used to produce

a. a power source for cars
b. the electricity we need
c. water purification systems
d. nuclear energy

NOTE: Objectives 5 - 9 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

AGRICULTURAL ECOLOGY AND THE ENVIRONMENT

XIII

OBJECTIVE 1

Part I		Part II	
1.	e	1.	h
2.	j	2.	n
3.	a	3.	c
4.	i	4.	a
5.	l	5.	k
6.	c	6.	m
7.	h	7.	l
		8.	e
		9.	d
		10.	i

OBJECTIVE 2

1, 4, 5, 7, 8, 9, 12, 13, 14, 17, 20

OBJECTIVE 3

Answers should include any ten of the following:

- Damage to the ozone layer
- Increased radiation levels
- Increased rates of cataracts and cancer, especially skin cancer
- Affected human immune system, making viruses, genetic defects, and many other medical conditions more likely
- Plankton and sea animal deaths
- Reduced crop yields
- Changed weather patterns
- Global warming (rising temperatures)
- Melting polar ice caps and rising ocean levels causing flooding

- Acid rain
- Damage to forests
- Damage to crops
- Damage to buildings and works of art
- Increased asthma, bronchitis, and heart disease
- Heavy metals in soil and water systems leading to poisoning
- Radon contamination

OBJECTIVE 4

1. a
2. d
3. b

OBJECTIVE SHEET

NATURAL RESOURCES – PARKS AND RECREATION

XIV

INTRODUCTION

You probably have some special outdoor place you like to go. Maybe it's a fishing spot or a park down the street. Maybe it's a national park your family visited on vacation. America is blessed with many scenic wonders, historic settings, and quiet public gardens. Parks and other public areas provide recreational areas, protect wildlife and natural settings, and make people aware of the importance of our environment.

UNIT OBJECTIVE

After completing this unit, the student will be able to recognize and discuss the roles of national parks, demands on land use, ecotones, the importance of ecosystems, and careers associated with parks and recreation. Students will demonstrate these competencies by completing assignment sheets and a written test with a minimum of 85% accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with parks and recreation to their definitions.
2. Select from a list roles of national parks.
3. List careers associated with parks and recreation.
4. Discuss how land use and management affect parks and recreation.
5. Choose the word or phrase that completes statements about ecosystems.
6. Select from a list true statements about ecotones.
7. Research a local site or resource. (Assignment Sheet 1)
8. Plot a hiking or canoeing trip on a map. (Assignment Sheet 2)
9. Write a plan for an outdoor trip. (Assignment Sheet 3)
10. Report on a trip to a park or historical site. (Assignment Sheet 4)

SUGGESTED ACTIVITIES

NATURAL RESOURCES – PARKS AND RECREATION

XIV

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to complete the class project outlined in the activity sheet.

- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit. Possible speakers for this unit include state or national park employees, local government officials, naturalists, and backpacking enthusiasts.

- Allow students time to complete Assignment Sheets 1-4.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with parks and recreation to their definitions.

- Add to the list related terms from previous units, as needed by students.

- Include descriptions and maps of nearby parks and public areas. Have students match each map or description to the park's name.

- Have students write their own definition of each word. Discuss the difficulties in defining "ecosystem".

Objective 2: Select from a list roles of national parks.

- Have students list other roles they think national parks fulfill.
- Have students list what the following people would see as the main role of national parks: an environmentalist, a tourism director, a politician.
- Have students research the history of the District of Columbia, Yosemite Valley, and the Hot Springs of Arkansas, all of which were preserved by the national government before national parks were designated.
- Use the *Resource Topics for Parklands* series to explore the variety of national parks.
- Have students make a list of area parks and what their main functions are. Have them do the same thing with a list of national parks.
- Ask a local official for plans and use predictions made before a local park was completed and have students compare them to the current park and its uses.
- Have students choose a national park and suggest how it might be different in 100 years. Have them do the same thing with a local public area.
- Have students complete the Activity Sheet.
- Use Student Supplements 1, 2, and 3 to support objective information.
- Have students complete Assignment Sheet 1.

Objective 3: List careers associated with parks and recreation.

- Have students write a national park office and ask how many people are employed by the park.
- Have students write the national park service and ask for a list of careers.
- Challenge students to think of five more careers associated with national parks.

Objective 4: Discuss how land use and management affect parks and recreation.

- Present examples of conflicting land use demands. Highway construction, environmental issues, the Alaskan wilderness, and offshore drilling may be issues currently in the news.

- Set up an impromptu debate. Have students assume roles of various groups with opposing land use demands.

- If you live in an urban area, have students attend a zoning commission meeting or interview a zoning commission member.

- Have students play a game suggesting the zoning laws they would most like to see. Suggest ideas such as all fast-food restaurants must be located across the street from your school, grouchy neighbors cannot live within six blocks of people under 21, etc.

- Remind students about soil, air, and water contamination. Discuss other ways rural land use affects people.

- Use Student Supplements 4 and 5 to support objective information.

Objective 5: Choose the word or phrase that completes statements about ecosystems.

Objective 6: Select from a list true statements about ecotones.

- Explain again that ecosystems and ecotones can be difficult to define.

- Have students identify "ecosystems" in their community. Examples might be the school, the hospital, etc. Have them identify any "ecotones" they find.

- Have students visit a wooded area or pond and list all the members of the ecosystem they can identify.

- Use information in Student Supplement 2 to support objective information.

APPLICATION

Objective 7: Research a local site or resource.

- Have students complete Assignment Sheet 1.

- If you prefer, group students and assign each group a site to research.

- Invite a representative from a local or area park to speak to students.

- Have students compare the information presented. If an area is reported on more than once, was the information consistent? If not, why?

- Have students identify needs or uses that are not met in the community and decide how they could best be met.

- If you are in a small or rural community, contact a larger city's park system and show students about services and opportunities offered there. These might include zoos, golf courses, rappeling sites, archery ranges, frisbee golf courses, and amusement parks.

- Have students discuss how parks in a retirement village would differ from those in a college town.

Objective 8: Plot a hiking or canoeing trip on a map.

- Have students use the map in Student Supplement 6 to answer the questions. Explain that the map is not a topographical map.

- Have students complete Assignment Sheet 2.

Objective 9: Write a plan for an outdoor trip.

- Invite a backpacking enthusiast to discuss preparing for a trip.

- Have students list all the items they would bring and estimate what they might weigh. Then have students discuss ways they could reduce the weight.

- Have students prepare a backpacking meal.

- Have students list all the trash they would have to carry out.

- Show students how to use a compass.

- Show students how to determine mileage on a map.

- Have students complete Assignment Sheet 3.

Objective 10: Report on a trip to a park or historical site.

- This exercise will challenge students to identify and express their feelings in their own way. Any method of recording what they saw and how it made them feel should be accepted, but neatness and answering the questions should be stressed.

- Enlist the aid of your school's art, creative writing, and audio/visual media specialists to help students complete their assignments.
- Have students complete Assignment Sheet 4.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements.
- Counsel students individually on pretest results and study requirements.
- Modify material in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked on the written test to demonstrate actions listed in the specific objectives.
- Evaluate students on assignment sheet activities if not previously done.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Complete appropriate section of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Print Media

- Drawford, Teri. *Protectors of the Wilderness: The First Forest Rangers*. Silver Burdett: Morristown, NJ, 1979.
- Oklahoma State Department of Tourism and Recreation, 500 Will Rogers Building, Oklahoma City, OK 73105, 1-800-652-6552, offers the following:

  Adventure Guides for each region of Oklahoma. Each Guide includes details about towns in the region, scheduled events, tourist attractions, and a state map.

Campground Directory and Calendar of Events including details about public areas throughout Oklahoma, the facilities at each area, and scheduled events.

Official State Map, includes mileage charts, tourist attractions, and an accurate map.

Detailed brochures about each state park and recreational area.

- Your local or area Chamber of Commerce, travel agent, or AAA office will have current brochures about national parks and state parks in Oklahoma and other states.

UNIT REFERENCES

- *Aquatic Project Wild.* Western Regional Environmental Education Council, 1987.
- Booher, Barbara. Superintendent, Little Bighorn Battlefield National Park. Interview, November 1991.
- Clopine, Bob. Park Spokesperson, Public Information Office, Yosemite National Park. Interview, November 1991.
- Hansel, John. Superintendent, Tallgrass Prairie Preserve. Interview, November 1991.
- *The Indians.* Time-Life Books: New York, 1973.
- *The National Parks: Index 1991.* U. S. Dept. of the Interior: Washington, D. C., 1991.
- *Project Wild.* Western Regional Environmental Education Council: Denver, 1986.
- *Resource Topics for Parklands, Parks, Etc.* U. S. Dept. of the Interior: Washington, D. C., 1991.
- Ward, David. *Outdoor Adventures.* Oklahoma State University. Interview, November 1991.
- Weissberg, Robert. *Understanding American Government.* Random House: New York, 1986.
- Zinn, Howard. *A People's History of the United States.* Harper and Row: New York, 1980.

INFORMATION SHEET

NATURAL RESOURCES – PARKS AND RECREATION

XIV

OBJECTIVE 1

Match terms associated with parks and recreation to their definitions.

- **ecosystem** – a group of living and non-living elements that work together in a natural community
- **ecotone** – the area in which two or more ecosystems overlap
- **monument** – a marker or structure built to signify the importance of a person, place, or event
- **national** – for or by the whole country
- **park** – an area of land set aside for recreation
- **reserve** – an area of land set aside to protect the habitat
- **zoning** – laws governing the construction and use of property

OBJECTIVE 2

Select from a list roles of national parks.

In 1872, President Grant signed a bill creating Yellowstone National Park, the first national park in the world. National parks, reserves, and monuments protect wildlife, natural land areas, historical sites, and other areas that should be preserved. Today national parks can be found in nearly every country in the world. These areas serve several purposes, including:

- Preserving natural wonders

  EXAMPLE: Grand Canyon National Park

- Preserving and interpreting history

  EXAMPLE: Civil War battle site parks

- Protecting natural forests, woodlands, etc.
- Providing recreational areas
- Protecting wildlife

- Providing research areas

  EXAMPLES: Wildlife research at reserves; forest fire research in Yellowstone

- Ensuring access for all citizens

  NOTE: All citizens have a right to use public lands. Access to public lands is free or affordable because public money is used to build and run the parks. If an individual built a similar park, admission would have to cover the cost of construction and maintenance.

OBJECTIVE 3 **List careers associated with parks and recreation.**

National parks and other public areas serve many functions. Because there are so many different types of parks, there are many careers available in parks and recreation. The list below includes some you are probably familiar with, and some that may surprise you.

- Superintendents
- Business managers
- Accountants
- Tour guides
- Forest rangers
- Firefighters
- Map makers
- Game wardens
- Botanists
- Photographers
- Film makers
- Statisticians
- Animal caretakers
- Hotel/restaurant managers and staff people
- Construction workers

- Architects
- Historians
- Surveyors
- Security workers
- Pilots
- Naturalists
- Computer programmers
- Public relations specialists

OBJECTIVE 4 **Discuss how land use and management affect parks and recreation.**

As our population continues to grow, there are more demands on available land. Industry, housing, highway systems, and schools require land. Environmentalists, historians, recreational groups, farmers, and ranchers can all have different ideas about how land should be used.

> Differences in land use have been one of the greatest influences in history. For example, as European city-states were invaded by wandering Germanic tribes, they united to protect their lands from a common enemy. As armies were combined, nations were formed. France, Spain, England, and Italy are among the nations formed this way.
>
> American history was also shaped by conflict over land use. During westward expansion, farmers and cattlemen fought over whether or not the plains should be fenced, cattlemen and sheep raisers fought over grazing land, and Indian tribes fought against settlers for possession of the land.

Today, we have laws and policies that govern land use because of such factors as the value of nearby land, the quality of air and water, the safety of people in the area, and the preservation of landmarks.

Urban areas control the use of land within city limits by imposing zoning regulations. These laws limit the types of construction and land use allowed on each piece of property. Zoning laws can be very specific, regulating how far from the street each structure must be, how many trees must be planted, and how tall the buildings can be.

Rural areas are not usually governed by zoning laws, but are still controlled by other laws and policies. People affected by land use can still have a voice in deciding whether or not the use is safe. For example, if you own land on both sides of a river, you do not have the right to dam the river if doing so will adversely affect people downstream.

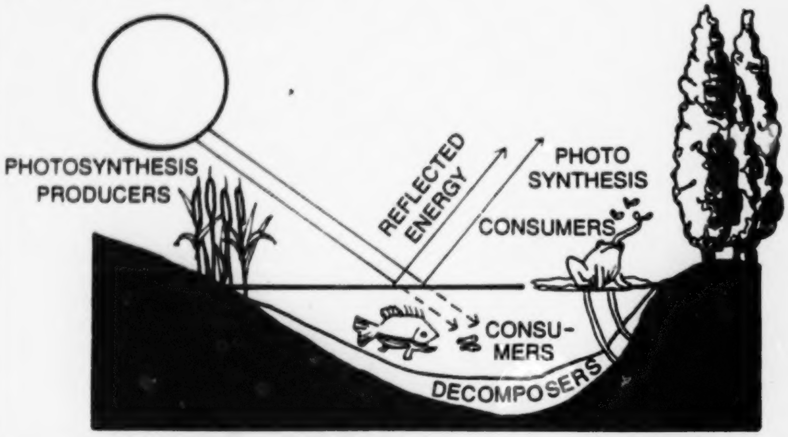
Even when people agree that public lands should be protected, they can disagree about what that means. For example, some may believe that if parks and beaches are for recreation, dune buggies should be allowed. But, others may say that if the parks are to protect fragile ecosystems, they should not.

Balancing the need for land and the priorities of different groups is difficult, and will become even more difficult in the future. Agricultural sciences will be important in understanding the effects of each demand and change.

Careful management of public lands is necessary to protect them. Forest management, designated use areas, watershed protection, and habitat maintenance are all important aspects of managing public lands.

OBJECTIVE 5 **Choose the word or phrase that completes statements about ecosystems.**

"Ecosystem" is a hard word to define because it can have several meanings, depending on the way it's used. For our natural resources unit, we will define **ecosystem** as *a set of living and non-living elements that work together in a community*. Perhaps the clearest example is an aquarium. The fish, plants, gravel, water, and air introduced into the aquarium live together, using each other's products and wastes. A similar ecosystem exists in every pond, stream, and lake.



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Forest ecosystems might include trees, birds, rodents, predators, soil, moss, insects, sunlight, rain, and rocks. Like the aquarium, this ecosystem includes all the living and non-living elements in the community. All these elements work together.

Where do ecosystems begin and end? That question is hard even for experts to answer. You could say there is only one ecosystem, the whole Earth. Generally, however, ecosystems are considered to be smaller areas. The important idea in any discussion of ecosystems is not the boundaries of the system, but the reliance of the elements on one another. You might compare it to "school." Who is a part of your school and who isn't? Are your teachers school members? What about substitute teachers? What about retired teachers? Just where does school membership begin and where does it end? In the same way, does the aquarium ecosystem discussed earlier include the electric system powering its filter? The human that pours a little food in the tank every day? The food that the human eats? Certainly these are important to the fish's survival, but they really aren't part of the aquarium community. "Ecosystem" refers to that community.

Each park houses ecosystems and they must remain in balance or they can collapse. If any single element is overly abundant or depleted or missing, the balance of the whole system is threatened. There are usually parts of the park's ecosystem that attract visitors and make the park important, and other parts that are not wanted.

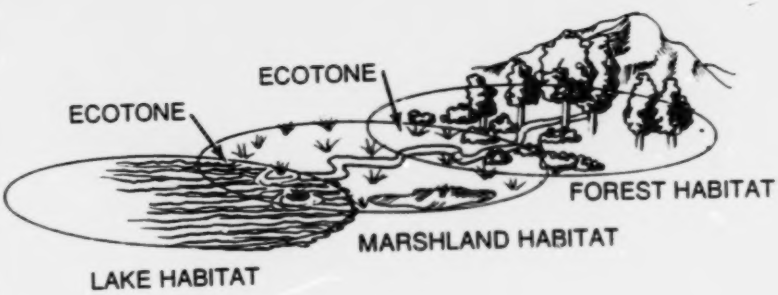
For example, at one time the prairie wolf, grizzly bear, and fox were common in the Plains. County and state governments offered bounties for these animals because they killed livestock. As these predators were removed, the deer and rodent populations increased, destroying crops. In addition, during winter and drought seasons, huge numbers of deer died from starvation.

> Quartz crystals used to be found in abundance throughout Quartz Mountain State Park in southwestern Oklahoma, near Altus. The park also contains natural ecotones found no place else in the world. So many crystals were removed by visitors that they are very scarce today. Laws to protect the fragile ecological balance have now made it illegal to remove any natural objects from the park. But regulation came too late for you, your parents or your friends to see the beautiful crystals and crystal clusters as they formed in their unique natural setting.

OBJECTIVE 6 **Select from a list true statements about ecotones.**

Ecotones are areas where two ecosystems overlap. For example, where a wooded area and a lake meet, two ecosystems come into contact and overlap. Birds living in the trees might eat bugs in the soft soil at the edge of the lake. Turtles and snakes in the lake sun themselves on branches that have fallen into the lake.

ECOTONES



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Changes to the ecotones, however, can affect both ecosystems. Ecotones attract a large variety of wildlife. Deer, for example, could drink cool water out of the lake without leaving safe woodlands. But, if the trees are removed, the water temperature might increase, the amount of soil and debris entering the lake will change, and the animals using the lake will find a different watering spot.

Ecotones also attract humans. Unfortunately, we often destroy them. Swimming areas, housing, dams, litter, and other man-made changes to the ecotones can separate the ecosystems.

Preserving ecotones in public areas can be especially difficult, because different groups of people may believe the area should be used in different ways. Some may want to leave the area undisturbed. Others may believe it should be accessible to a large number of people, perhaps with a highway and hotel. Still others might want swimming areas, fishing areas, boat docks, and other recreational areas. These demands can disturb the delicate balances of ecotones.

OKLAHOMA'S TALL GRASS PRAIRIE PRESERVE

Parks can protect ecosystems, and when ecosystems have been destroyed, parks can also rebuild them. One example is the Tallgrass Prairie Preserve near Pawhuska, Oklahoma.

The Tallgrass Prairie was once the largest ecosystem on Earth. It stretched from Canada to the Gulf of Mexico and covered 12 states and 142 million acres. When the first pioneers reached the prairie, they couldn't even plow the hard ground. Maps of the time called it the "Great American Desert." The ecosystem included 250-400 types of plants, 80 species of mammals, 300 bird species, and countless insects, reptiles, and amphibians. It also included two important ingredients: the natural weather pattern and natural fires. Every three to five years the prairie burned.

Then, in 1846, John Deere invented a steel plow capable of breaking the prairie sod. Within a few years, the prairie could be farmed, disturbing the delicate ecosystem. Settlers moved west, hunted the buffalo, and put out the fires. Farmers replaced the grass with other crops and housed livestock on the land. As the plants that fueled the fires disappeared from the prairie, the fire cycle ended. Trees that had never been able to grow on the prairie appeared on the hills and rangeland. By 1990, only 10% of the tallgrass prairie remained and the tallgrass prairie ecosystem was extinct.

Conservationists attempting to save the last of the prairie proposed a Tallgrass Prairie National Park. But in 1988, the bill was defeated. At that point, the Nature Conservancy bought the proposed land and now runs the Tallgrass Prairie Preserve. The preserve is not an attempt to protect the remaining 10 percent of the prairie, but is actually an attempt to reintroduce the prairie ecosystem back into the American plains.

In Fall 1993, bison will be released into the prairie. Superintendent John Hansel hopes to eventually have 1500-2000 free-roaming head of bison. Other predators cannot be reintroduced. Some, such as the prairie wolf are now extinct; others, such as the grizzly, will not be included by choice.

Experts at both the University of Oklahoma and Oklahoma State University are conducting in-depth studies of the plants, insects, and other elements in the ecosystem. They are also studying records of when and how often the prairie burned and other details.

They plan to duplicate as many details as possible by reintroducing plant and animal species, conducting controlled burns, and maintaining free-roaming herds. Herd population will only be controlled as necessary to protect the ecosystem.

The project will cost an estimated $15 million. Pawhuska rancher and tallgrass expert Dick Witsle predicts it will take 100 years for the prairie ecosystem to function as it once did. Even then, there will be differences. Superintendent Hansel sums it up: "It will never be like it was—but it will be close."

YOSEMITE

The oldest known living thing in the world is a tree in Yosemite National Park. Known for its giant sequoias, dazzling waterfalls, and peaks such as Halfdome and El Capitan, Yosemite is one of the most popular parks in the world. Each year more than 3.5 million people visit the 750,000 acres. The park is so large and so remote, it has its own post office, zip code, police force, jail, and court. It also has business offices, refreshment stands, restaurants, lodges, and housing for up to 850 employees.

But in recent years, it has been in the news for other reasons. Although the park is very large, most visitors come only to see Yosemite Valley, which is only 1 percent of the park's area. Because so many visitors are in the valley, most facilities were constructed there. Park administrators began to worry about the effect of so many people on the park. In 1980, the General Management Plan was formulated and adopted. It found that the environment was being harmed by the number of tourists and listed changes that could be made.

Park spokesperson Bob Clopine explains that the main goal of the park staff is to "preserve and protect the park and at the same time, make it available to those willing to treat it in a gentle manner."

The staff began limiting the number of people allowed in the park overnight. On extremely crowded weekends, such as July 4th, Labor Day, and Memorial Day, the staff closes off crowded areas of the valley. A shuttle bus takes visitors around the park, cutting down on the number of cars being driven. Several roads have been removed and replaced with bike and walking paths. Future plans include removing many of the valley buildings and replacing them with new structures in less-used park areas. Small changes have also been made, such as instituting a recycling program and not using polystyrene cups. The entire staff is expected to participate, even to pick up litter. "We hope that the staff will become role models to the visitors," Mr. Clopine adds.

These changes have improved the park. "There is probably less impact on the park from the last 20 years than there was on the park 20 years ago," Mr. Clopine states. He admits that there are still people who feel there is too much technology and those who feel the park needs more facilities and roads. "It's a balancing act—but it's still a beautiful place."

LITTLE BIGHORN BATTLEFIELD NATIONAL MONUMENT

In 1876, General George Armstrong Custer led his troops into a valley near the Little Big Horn River in Montana. More than 2,500 Sioux and Cheyenne, led by Crazy Horse, attacked and killed Custer and all his troops.

It was the first Indian attack by a combined force, the only major Indian victory, and a turning point in the "Indian Wars." Custer's bloody death added to the legends about him. He had become America's youngest general, been suspended from service for abandoning his post and mistreating soldiers, developed brilliant military strategies that many believed won the Civil War, and been suggested as a Presidential candidate.

The Little Big Horn River, called the Greasy Grass by the Indians became an important historical site. No clear picture of what really happened there or why has developed yet, even though every detail of the site has been documented. Park Superintendent Barbara Booher explains, "The colors of their horses, even the buttons the soldiers were wearing have been studied."

To preserve this important site, the land was set aside as the Custer Battlefield National Park. A visitor's center was built to help the Park Service interpret, as well as preserve, what had happened.

But how was it interpreted? When the park was designated, it was seen as a tribute to the soldiers killed there, so displays and markers described the solders' perspective of the battle only. When Ms. Booher, a Native American, became Superintendent, several displays were changed to include information about the Indians who fought there. Plans were made to build a monument to the Indians, in addition to the existing monument to the 7th Cavalry. These changes upset some people and Congress withheld funding for the monument.

Publicity about the controversy drew national attention to the park. Many citizens believed the history tnat should be preserved and interpreted should include more than the role of the American Army, and donations to the Indian monument poured in. In December 1991, President George Bush signed legislation renaming the park from the Custer Battlefield to the Little Bighorn National Monument.

The debate is now complicated by a proposed visitor's center displaying the role of women in the Indian Wars, particularly in the Battle of the Little Big Horn.

What happened in 1876 has not changed, but how it is interpreted by society has. These new views affect the park's maintenance and growth. Ms. Booher explains that similar, new approaches are occurring in other parks in America. In 1991, during its 75th anniversary, the Park Service reevaluated its overall goals and directions. Changes are foreseen, including working more closely with businesses and other non-government agencies.

Other shifts in our society's view of history that have affected our parks include the return of Indian remains to grave sites and families, monuments to the Civil Rights Movement of the 1960's, and the restoration of Ellis Island Immigration Station in New York.

LAND USE DEBATES AND THE AMERICAN REVOLUTION

You've heard about the American Revolution—about the Boston Tea Party, the "shot heard 'round the world," and Washington crossing the Delaware and later becoming our first president.

But do you know that disagreements about land use led to heated, even violent, arguments among our founding fathers? Two of America's first political parties, the Democrat-Republicans and the Federalists, were basically formed along the lines of agricultural vs. commercial land use. Some historians believe this same conflict eventually led to the Civil War.

The Democrat-Republicans were led by James Madison, James Monroe, and Thomas Jefferson. Jefferson was a highly educated man. He believed that the nation's government should be patterned after Roman government. He pictured the nation spreading to the Pacific Ocean, and neatly divided into squares. He believed that for the nation to be strong and healthy, it should rely on agriculture, not commerce.

On the other hand, Alexander Hamilton and George Washington were Federalists and believed the new government should favor banking and business. They agreed that agriculture was an important business in America, but saw it as one of many.

These disagreements led to great compromises, duels, and public debate. Those supporting a strong agricultural nation believed laws should protect farmers by allowing them to import tools and finished products cheaply, to own slaves, and to elect a set number of representatives from each area, regardless of the population. Federalists disagreed, supporting the government's right to tax imported goods, to base representation on population, and to create a strong national bank.

The issues were never clearly resolved. The people elected representatives from both parties to the White House. Compromises over taxing imported goods, slavery, and other related topics continued until the 1860's, when the Civil War erupted. Although slavery was a source of conflict between the North and South, the conflicts went much further, and were usually land-use based.

WHO GETS THE WATER?

Water is one of Oklahoma's greatest natural resources. It is vital not only to Oklahoma's quality of life, but also to its agriculture, trade, manufacturing, and tourism industries. One of the most important bodies of water in Oklahoma is the Arkansas River.

The Arkansas River flows through Oklahoma, from near Ponca City to the Arkansas border near Arkoma. It flows through Tulsa and Muskogee, past Walnut Creek, Keystone, and Spiro Mounds State Parks. It is the main artery of the McClellan-Kerr Arkansas River Navigation System, a series of locks and waterways linking Oklahoma to the Gulf of Mexico. Annual duck races for charity, sandcastle-building contests, raft races, and other celebrations are held on its banks. It feeds many lakes, including Keystone, Kaw, and Kerr.

Many of the smaller rivers and streams feeding into the Illinois River are also important to Oklahoma industries. For example, before it meets the Arkansas River, the Illinois provides water for Tahlequah and other nearby towns, fills Tenkiller Lake, and provides one of Oklahoma's most popular tourist attractions: canoe trips down the Illinois north of the Tenkiller area.

Because the Illinois River is so important, Oklahomans became concerned when Fayetteville, Arkansas announced plans to build a new sewage treatment facility and dump treated waste into the river. A study of the Arkansas plan by Oklahoma officials indicated the water downstream of the sewage plant would not meet Oklahoma water standards. Studies showed that the pollution would not only affect the Illinois itself, but also the important Arkansas River.

Agriculture in Arkansas also seriously polluted the Illinois. It was estimated that animal husbandry in Arkansas had twenty times the impact on Arkansas's environment that people did. Poultry farming along the Illinois had the same effect on the river as a city of about one million people.

Agriculture polluted the river to a certain degree, but the additional pollution from the proposed Fayetteville sewage treatment plant would pollute the river to levels prohibited by Oklahoma law.

Before the Fayetteville sewage treatment plant could be built, the Environmental Protection Agency had to study the plans and approve the plant. Oklahoma asked the EPA to deny Fayetteville permission to build the plant. However, the EPA disagreed with Oklahoma findings, determined the plant would not affect Oklahoma water quality, and allowed the plant to be built.

Oklahoma sued both the state of Arkansas and the EPA. The 10th Circuit Court reviewed both studies and found that the EPA's information was not correct. Oklahoma won the lawsuit; however, both Arkansas and the EPA appealed the case to the U.S. Supreme Court. While the court case was being heard and appealed, the sewage treatment plant was built and began operation.

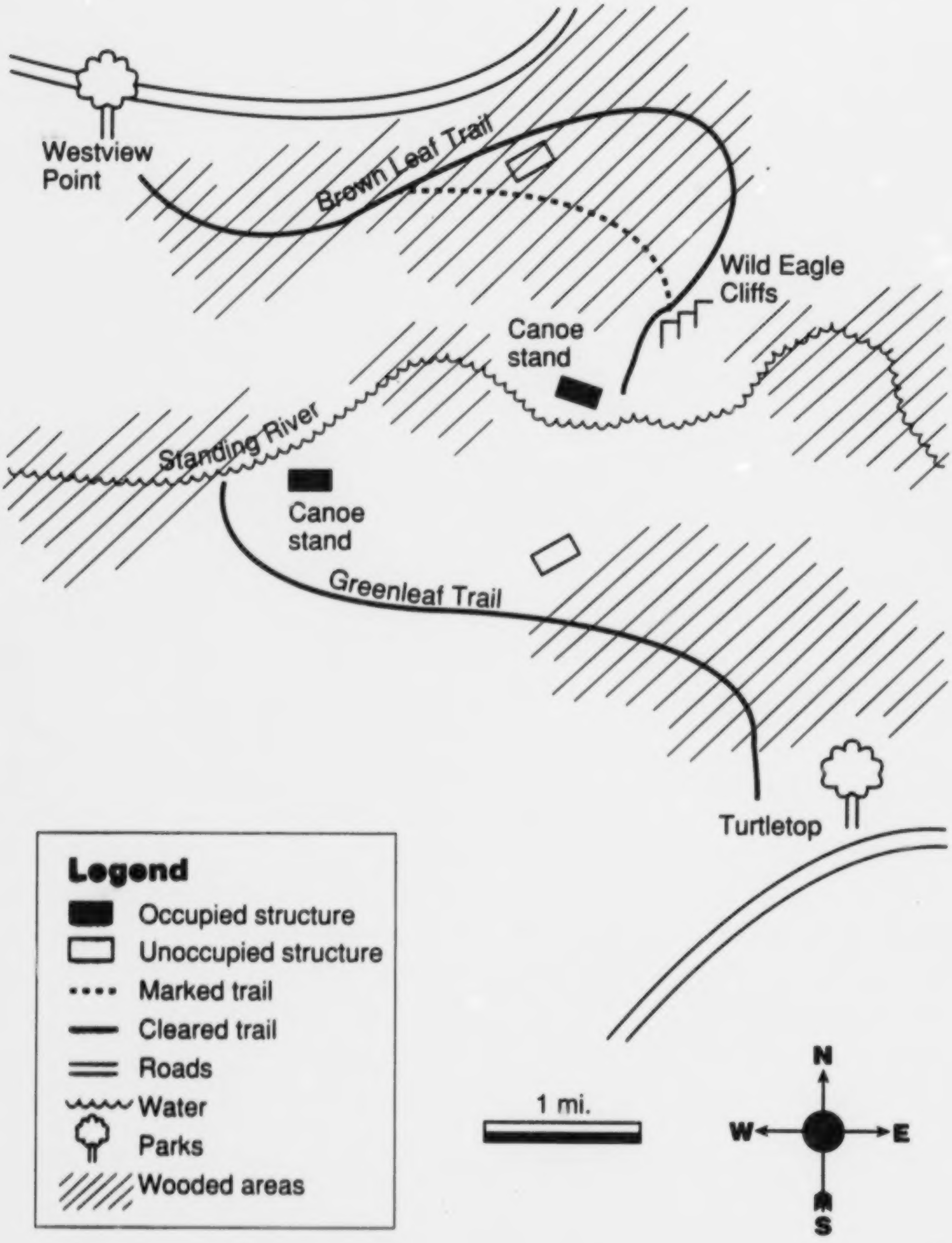
By the time the suit reached the Supreme Court, twenty other states had entered the case, thirteen supporting Oklahoma's position, seven supporting Arkansas. All were concerned that the case could affect their state by raising water quality standards or by endangering water supplies.

Oklahoma Assistant Attorney General Brita Haugland Cantrell argued Oklahoma's case before the Supreme Court. She claimed the Clean Water Act prohibited Arkansas from polluting the river above levels accepted in Oklahoma. She also argued that the EPA did not interpret Oklahoma standards correctly, or the EPA would not have granted Fayetteville the permits. Arkansas argued that Oklahoma could not impose its standards on another state. The EPA argued that Oklahoma was correct in that Arkansas could not pollute the river above Oklahoma levels; but claimed that when the lower court found in Oklahoma's favor, it did not understand the EPA study.

In March 1992, the Supreme Court handed down its decision. They agreed with the EPA that Oklahoma did have a right to police the water quality of the Illinois River, and that the EPA findings should be followed.

Oklahoma was not able to stop construction of the sewage treatment plant, but the Supreme Court decision has many important implications. According to the decision, Oklahoma has the right to monitor pollution levels and sue the state of Arkansas if those levels are not acceptable under Oklahoma law. Governor Walters immediately set up the Illinois River Task Force, which will look into Oklahoma's options.

TRAIL MAP


Westview Point
Brown Leaf Trail
Wild Eagle Cliffs
Canoe stand
Standing River
Canoe stand
Greenleaf Trail
Turtletop
Legend
Occupied structure
Unoccupied structure
Marked trail
Cleared trail
Roads
Water
Parks
Wooded areas
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ACTIVITY SHEET

Development of:
SCIENCE SKILLS
INTERPERSONAL OR RELATING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why science, interpersonal or relating, and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

SCIENCE SKILLS

- Investigating conservation of physical resources
- Investigating conservation of living resources
- Investigating issues of environmental impact
- Applying science principles to environmental issues

INTERPERSONAL OR RELATING SKILLS

- Interacting with professional colleagues/associates
- Participating in group activities

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Defining a problem
- Devising a solution
- Creating a finished product
- Developing an action plan

SSO

- Emphasize to the students that criteria for grading their assignment will include all of the following:

  1. Planning (investigating problem, finding a solution, planning steps to solve problem)
  2. Obtaining approval
  3. Participation in work
  4. Completion of assigned activities

- If students have difficulty investigating conservation of physical resources:

  - Define "physical resources" and discuss which physical resources are part of this assignment.

  - Discuss the importance of conserving physical resources.

- If students have difficulty investigating conservation of living resources:

  - Define "living resources" and discuss which living resources are part of this assignment.

  - Discuss the importance of conserving living resources.

- If students have difficulty investigating issues of environmental impact:

  - Discuss the importance of understanding environmental issues.

  - Discuss the possible consequences of ignoring or being uninformed about issues of environmental impact.

- If students have difficulty applying science principles to environmental issues:

  - Discuss various science principles that might affect the planning of this assignment.

    EXAMPLE: Food chain: Will introducing a new food source cause an increase in the normal food source? Will providing birdseed increase the insect population?

  - Discuss the fact that applying science principles to environmental issues may enable us to halt or reverse the erosion of our environment.

- If students have difficulty interacting with or dealing effectively with professional colleagues/associates:
  - Review communication and interpersonal or relating skills.
  - Remind them that professionals are an excellent source of information.
- If students have difficulty participating in group activities:
  - Discuss the goals of the group.
  - Define each student's responsibilities within the group.
  - Suggest they list the questions they hope to answer.
- If students have difficulty defining a problem:
  - Review the available information.
  - Discuss the critical elements/issues.
  - Instruct the students to ask themselves what changes could be made in an issue.
- If students have difficulty devising a solution:
  - Review the critical elements/issues of the problem.
  - Review the definition of the problem.
  - Review the goals for solving the problem.
  - Discuss the alternative they have chosen to solve the problem.
- If students have difficulty creating a finished product:
  - Review the information.
  - Instruct them to examine the goals of the assignment.
  - Instruct them to work one step at a time until the project is finished.
  - Suggest they plan steps for attaining their goals.

- If students have difficulty developing an action plan:
  - Instruct them to list their goals.
  - Discuss the steps necessary to attain the goals.
  - Instruct them to arrange the steps in a logical order.
- If students have difficulty mastering a specific job task/procedure:
  - Examine each component of the procedure to determine which area is causing difficulty.
  - Review the entire procedure.

COMPLETE A PARK IMPROVEMENT PROJECT

INTRODUCTION

Parks are public land. That means they belong to everyone. Keeping parks and other public areas clean and usable is everyone's responsibility.

DIRECTIONS

As a class, choose a park or other public area near your school and plan a project to improve it. Contact the government agency responsible for the park for approval of your project. Some suggested projects include the following:

- Pick up litter
- Repaint benches, trash cans, playground equipment, etc.
- Provide bird seed, squirrel food, or other wildlife support
- Plant wild flowers
- Clear and mark paths
- Raise or collect money to purchase new equipment

NOTE: You might be asked not to repair, build, or purchase equipment because of liability laws and insurance.

SUGGESTED
EVALUATIVE CRITERIA

1.	Planning (investigating problem, finding a solution, planning steps to solve problem)	30 points
2.	Obtaining approval	10 points
3.	Participation in the work	30 points
4.	Completion of assigned activities	30 points
	TOTAL	100 points

Earth Science Skills

- Investigate conservation of physical resources
- Investigate conservation of living resources
- Investigate issues of environmental impact
- Apply science principles to environmental issues

General Relating Skills

- Interact with professional colleagues/associates
- Participate in group activities

Cognitive Activities Skills

- Define a problem
- Devise a solution
- Create a finished product
- Develop an action plan

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, oral communication, creative thinking/problem solving, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Gaining factual information
- Using magazines and newspapers

WRITING SKILLS

- Constructing graphics and symbols
- Taking notes

ORAL COMMUNICATION SKILLS

- Applying active listening skills

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Collecting/recording information
- Identifying critical elements/issues

SOCIAL STUDIES SKILLS

- Collecting/recording data
- Interpreting maps/globes

- If students have difficulty gaining factual information:
  - Read or examine sources carefully, noting key words and ideas.
  - Suggest they make a list of questions they hope to answer.
- If students have difficulty using magazines and newspapers:
  - Discuss the main purpose and goals of various magazines.
  - Examine the structure of various magazines and newspapers.
- If students have difficulty constructing graphics and symbols:
  - Discuss the use of graphics and symbols to convey information.
  - Suggest they list the information they intend to display graphically.
- If students have difficulty taking notes:
  - Instruct them [illegible] view the information on note taking that is in Assig[illegible] Sheet 1 of the unit on "Record Keeping."
  - Remind them to apply active listening skills.
  - Remind them that note taking is a skill that improves with practice.
  - Discuss the importance of taking notes accurately.
- If students have difficulty applying active listening skills:
  - Encourage them to fa[illegible]ze themselves with background information before the communication begins.
  - Suggest they be ready to listen before beginning the communication.
  - Stress the importance of focusing on the speaker.
  - Remind them that maintaining eye contact enhances listening ability.
- If students have difficulty collecting/recording information, suggest they read or examine sources carefully, noting key words or ideas.

- If students have difficulty identifying critical elements/issues:
  - Read or examine sources carefully, noting key words or ideas.
  - Suggest they list the questions they hope to answer.
- If students have difficulty interpreting maps/globes:
  - Examine and define the various components of a map.
  - Discuss the purpose of the map.
  - Discuss the types of information that can be conveyed by a map.
  - Examine the orientation, legend, and scale on the map.
- For additional suggestions on teaching basic skills refer to Instructional Supplement 1.

ASSIGNMENT SHEET 1

NATURAL RESOURCES — PARKS AND RECREATION

XIV

Name ______________________________ Score ____________

OBJECTIVE 7 **Research a local site or resource.**

INTRODUCTION You can probably think of several public areas near your home. But how much do you know about them? Who maintains them? How many people use them? What do they cost taxpayers? What plans for the future involve the areas?

DIRECTIONS

1. Select and research a public area.
   - Read park brochures your instructor provides.
   - Read newspaper articles about the park.
   - Take notes during a park representative's visit to your class.
2. Find a picture of the park. The picture can be a photograph, drawing, newspaper clipping, or any other photo.

   OR

   Draw a map of the park.
3. Answer the following questions:
   a. What is the primary use of the park?

   ____

   ____

   b. How many people use it each year?

   ____

Reading Comprehension Skills
- Gain factual information

Research and Reference Skills
- Use magazines and newspapers

Composition Skills
- Construct graphics & symbols

Research Skills
- Take notes

Listening Skills
- Apply active listening skills

Cognitive Activities Skills

- Collect/record information
- Identify critical elements/issues

Information Analysis Skills

- Collect/record data
- Interpret maps/globes

c. What are some other uses of the park?

d. Who pays for the park?

e. What does it cost to maintain the park each year?

f. How did the land become a park?

g. What are some future plans for the park?

ASSIGNMENT SHEET 2

Development of:
READING SKILLS
MATHEMATICS SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, employability, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Gaining factual information
  - Interpreting graphics and symbols

  MATHEMATICS SKILLS

  - Calculating with whole numbers
  - Using English and metric measures
  - Solving time/rate/distance problems
  - Making measurements

  SOCIAL STUDIES SKILLS

  - Collecting/recording data
  - Interpreting maps/globes

- If students have difficulty interpreting graphics and symbols:
  - Instruct them to examine the source carefully to obtain information.
  - Discuss the types of information that can be conveyed graphically.

- If students have difficulty calculating with whole numbers:
  - Review basic skills in addition, subtraction, multiplication, and division.
  - Review mathematical terminology.

    EXAMPLE: "Compare" is an indication that you must subtract.
- If students have difficulty using English and metric measures or making measurements:
  - Review the English and metric systems of measurement.
  - Determine which measurement system is used on the available equipment and demonstrate its use.
- If students have difficulty solving time/rate/distance problems:
  - Suggest they construct a simple chart to help them visualize the problem.

    EXAMPLE:

TIME	RATE	DISTANCE
2 hours	60 MPH	120 miles
1 hour	60 MPH	60 miles
3 1/4 hours	60 MpH	195 miles

  - Instruct them to examine the relationship between time, rate, and distance.
  - Discuss the fact that this is a skill that is used often in daily life.
- For additional suggestions on teaching basic skills, refer to Instructional Supplement 2.

ASSIGNMENT SHEET 2

NATURAL RESOURCES — PARKS AND RECREATION

XIV

Name ______________________ Score __________

OBJECTIVE 8

Plot a hiking or canoeing trip on a map.

INTRODUCTION

Going for a walk is fun and good for you. But hiking and canoeing are hard work—before you ever leave home! Planning where to go, what to take, and how long you will be gone can mean the difference between a successful trip and disaster.

DIRECTIONS

Reading Comprehension Skills
- Gain factual information

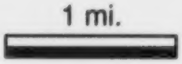
Functional Reading Skills
- Interpret graphics & symbols

Operation and Calculation Skills
- Calculate with whole numbers

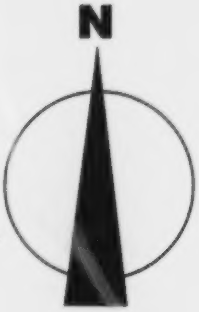
Math Application Skills
- Use English & metric measures
- Solve time/rate/distance problems

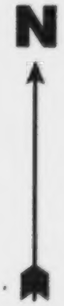
Functional Math Skills
- Make measurements

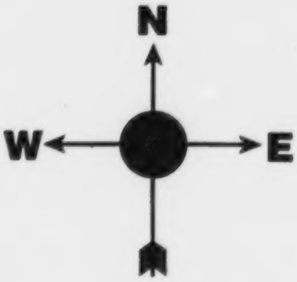
The first step is reading a map of the area. To read the map, begin by looking at the "key" or "legend." The legend will tell you what symbols are used, what they mean, and what scale is used. Scale is the amount of distance represented by smaller units on the map. For example, a road may be one mile long. On a map, the line representing the road might be one inch long. In this case, the legend would say "1 inch = 1 mile" or it might have a drawing like this:



After you find the legend and understand how to read the map, look for a sign showing which way is North. Usually north is the top of the page, but some maps are arranged differently. These signs are usually like one of these:

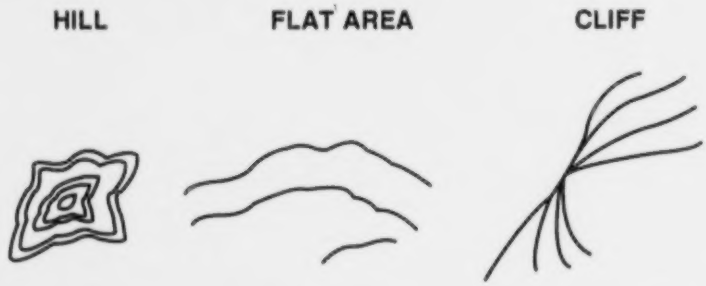






Information Analysis Skills
- Collect/record data
- Interpret maps/globes

Some maps are called contour or topographic maps. These are the best to use when planning a back-packing trip. Contour lines represent elevations. If the land is flat, the contour lines will be far apart and you can plan on fairly easy hiking. If the land is hilly or steep, the contour lines will be close together and hiking will be harder and take longer.



Use the information above to answer questions about the map in Supplement 6. The trails and other distances can be measured by placing a string along the curved lines of the trail and then holding the string along the scale.

1. How long is the Green Leaf Trail? ____________________
2. If you traveled 10 miles per day on cleared trails and walked beside the river between the canoe stands, how long would it take you to travel from Westview Point to Turtletop?

   ____
3. How many unoccupied buildings are on the map? __________
4. How long is the marked trail between Wild Eagle Cliffs and Westview Point? ____________________

   NOTE: Marked trails are not always clear paths. Instead of signs, rocks and sticks are used to tell hikers where to go.

ASSIGNMENT SHEET 3

Development of:
READING SKILLS
WRITING SKILLS
MATHEMATICS SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, writing, mathematics, creative thinking/problem solving, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

READING SKILLS

- Gaining factual information

WRITING SKILLS

- Stating ideas clearly

MATHEMATICS SKILLS

- Calculating with whole numbers
- Using English and metric measures
- Solving time/rate/distance problems
- Making measurements

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Identifying critical elements/issues
- Identifying/developing alternatives

SOCIAL STUDIES SKILLS

- Interpreting maps/globes

- If students have difficulty stating ideas clearly:
  - Instruct them to use simple, concise language.
  - Instruct them to organize their thoughts before they begin writing.
- If students have difficulty identifying critical elements/issues:
  - Review the information, noting the key words and issues.
  - Instruct the students to ask themselves what changes could be made in an issue.
- If students have difficulty identifying/developing alternatives:
  - Suggest they use intuitive thinking techniques.
  - Discuss and define the main goal.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1, 2, and 3.

ASSIGNMENT SHEET 3

NATURAL RESOURCES – PARKS AND RECREATION

XIV

Name ______________________________ Score __________

OBJECTIVE 9

Write a plan for an outdoor trip.

INTRODUCTION

How many things do you use every day? Could you carry them with you—all of them? Your bed, your clothes, your food? What if you had to carry everything you used for several days? What if you had to protect it from rain the whole time?

That is one of the challenges of backpacking and canoeing. Experienced hikers know what clothes to take, how to store lightweight foods, and also how to pack them. They also know that the key to a successful trip is planning ahead.

DIRECTIONS

1. Using a map, determine how many days it would take to complete the trail.
2. Mark the path you would take and where you would plan to camp each night.
3. Use the list on page 47 to determine what you would take on the trip. Add any personal items, such as a journal, radio, etc., **if they do not add too much weight to your backpack.**
4. Determine how many meals you would have to eat on the trip. Plan the menus. List all the ingredients you would need for each meal.

Reading Comprehension Skills
- Gain factual information

Language Skills
- State ideas clearly

Operation and Calculation Skills
- Calculate with whole numbers

Math Application Skills
- Use English & metric measures
- Solve time/rate/distance problems

Functional Math Skills
- Make measurements

Cognitive Activities Skills

- Identify critical elements/issues
- Identify/develop alternatives

Information Analysis Skills

- Interpret maps/globes

Before you try hiking . . .

Hiking, like any other sport, requires some training and experience. If you are interested in hiking, contact a local naturalist or hiking club and join them for your first outings.

Be sure your socks, shoes, backpack, frame, bedroll or sleeping bag, and compass are adequate and your map is up-to-date. Some parks or recreational facilities rent equipment.

Before you leave, be sure your parents or another person has a copy of the map you will be using with your trail marked and the time you plan to leave and arrive home. If you are going by yourself, leave a copy of your footprint by placing a sheet of aluminum foil over a folded towel and stepping on it.

If you get lost or hurt and cannot follow the trail, find a tree and stay put. Let rescuers find you.

BACKPACKING EQUIPMENT LIST

TEN ESSENTIALS:
compass
clothing (enough for adverse conditions)
extra food and water
flashlight (reliable)
fire starter
first aid kit
sunglasses (goggles or clip-on)
pocket knife
topographic map
waterproof matches (or in waterproof container)

PACKING:
backpack with padded hip belt
pack cover (waterproof nylon or large plastic bags)
plastic bags for storage (assorted sizes)

SLEEPING:
sleeping bag (in waterproof bag)
foam sleeping pad
sleep clothes (worn only in sleeping bag)
tarps to hold sleeping bag on pack
waterproof ground cloth, 5' x 7'
tent

WEARING (packed in water proof bags):
hiking boots (well broken in)
camp shoes or sandals
2 pairs heavy wool socks
3 pairs lighter inner socks (polypro preferable)
2-3 pairs underwear
2-3 short sleeve shirts (not nylon)
1 long sleeve shirt (wool preferable)
1-2 pairs hiking shorts
1 pair long pants (not jeans, wool preferable)
1 sweater (wool)
1 pile jacket
1 sturdy rainsuit
wool or pile gloves or mittens
plus any additional clothing for road trip

EATING:
deep bowl or plate
cup (can serve in place of above)
spoon (fork and knife optional)
water bottles (2 qt. min. total capacity)

PERSONAL AND MISCELLANEOUS:
lip protection (not carmex)
bandannas or handkerchiefs
whistle
money (small bill and some change for trail)
soap (biodegradable)
toothbrush/toothpaste
comb
small towel
adhesive bandages
note pad and pen
toilet paper (unscented)
water purification kit

OPTIONAL:
fanny pack or daypack
stocking cap
binoculars
camera and film
watch
fishing equipment/licenses
insulated underwear
nylon cord
foot powder
nature field guides
insect repellant

MENUS

How many meals will be eaten on the trail? ____________________

What are the menus for each day?

What are all the ingredients?

ASSIGNMENT SHEET 4

Development of:
WRITING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why writing, science, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  – Using standard grammar, spelling, and capitalization

  – Stating ideas clearly

  – Composing reports

  – Constructing graphics and symbols

  SCIENCE SKILLS

  – Investigating physical characteristics of the earth

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  – Collecting/recording information

  – Analyzing/synthesizing information

  – Creating a finished product

- Emphasize to the students that criteria for grading their assignment will include all of the following:

  1. Use of good language skills (grammar, spelling, capitalization, punctuation)
  2. Clarity of description of what was seen
  3. Clarity of description of feelings
  4. Neatness

1000

- If students have difficulty using standard grammar, spelling, and capitalization.:
  - Review basic grammar skills.
  - Review rules for using capitals.
  - Encourage them to use a dictionary to check the spelling of any words of which they are uncertain.
  - Discuss the importance of being able to communicate by the written word.
- If students have difficulty composing reports:
  - Instruct them to determine the purpose of the report.
  - Remind them to carefully select a subject.
  - Instruct them to write down their preliminary ideas.
  - Suggest they organize their ideas.
  - Instruct them to write a first draft and to carefully proofread and evaluate it in order to make corrections and revisions before making the final copy.
- If students have difficulty investigating physical characteristics of the earth:
  - Instruct them to look and listen carefully to discover the physical characteristics of the earth.
  - Discuss the importance of having knowledge about the earth.
  - Discuss ways in which the physical characteristics of the earth affect the people living in a certain locale.
- If students have difficulty presenting personal opinion/viewpoint:
  - Discuss the difference between fact and opinion.
  - Discuss the importance of providing information to support their opinions.
  - Discuss the importance of investigating their own opinions and feelings.

- If the students have difficulty integrating audiovisual materials in oral presentations:
  - Instruct them to use audiovisual materials that add to or support the information that is being presented.
  - Discuss the ways that audiovisual materials can enhance their presentation.
- For additional suggestions on teaching basic skills, refer to Instructional Supplements 1, 2, and 4.

ASSIGNMENT SHEET 4

NATURAL RESOURCES – PARKS AND RECREATION

XIV

Name ______________________________ Score ____________

OBJECTIVE 10

Report on a trip to a park or historical site.

INTRODUCTION

How do you use parks? What do you think is the most important thing the park offers? What emotions do parks inspire in you?

DIRECTIONS

1. Visit a park or public area.
2. While you are there, record what you see and how it made you feel. You can record it any way you like: by taking notes, making a video tape, drawing a picture, taking photographs, or any other means.
3. Prepare your report to be turned in:
    - Be sure what you prepared is what was assigned. In this case, that means asking yourself if it includes (1) what you saw and (2) how it made you feel.
    - Check spelling and grammar.
    - Be sure the copy you are going to turn in is neat and clean. Papers should not be creased or smudged. Photos should be matted or in plastic sleeves. Drawings should be flat and matted or rolled and stored in a cardboard tube. Written reports should be in report folders. Video tapes should be clearly labeled.
    - Be sure your name is clearly written on everything you turn in.
4. Turn your work in to your instructor.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Composition Skills
- Compose reports
- Construct graphics & symbols (non-numerical)

Earth Science Skills
- Investigate physical characteristics of the earth

Cognitive Activities Skills
- Collect/record information
- Analyze/synthesize information
- Create a finished product (written)

SUGGESTED
EVALUATIVE CRITERIA

1.	Use of good language skills (grammar, spelling, capitalization, punctuation)	20 points
2.	Clarity of description of what was seen	30 points
3.	Clarity of description of feelings	30 points
4.	Neatness	20 points
	TOTAL	100 points

ASSIGNMENT ANSWERS

NATURAL RESOURCES – PARKS AND RECREATION

XIV

ASSIGNMENT SHEET 1	The questions should be completely and accurately answered, according to information provided by your guest speaker. Each student should turn in a photo, drawing, newspaper photo, or map of the park.
ASSIGNMENT SHEET 2	Answers will vary somewhat depending on accuracy of measurement. Assignment Sheet should be graded on use of proper techniques.
ASSIGNMENT SHEET 3	Answers must include all ten necessities (compass, clothing, food and water, flashlight, fire starter, first aid kit, sunglasses, pocket knife, map, and waterproof matches). Weight should be considered in all personal decisions (radios, snacks, etc.). Check that appropriate amounts of food (2 days worth), water (2 quarts per day), and clothing are included.
ASSIGNMENT SHEET 4	This exercise forces students to choose a means of expression. Any format, whether listed in the assignment sheet or not, should be allowed. Work should be graded on descriptions, both of what was seen and how it affected the student. Grading should also reflect neatness.

NATURAL RESOURCES – PARKS AND RECREATION

XIV

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with parks and recreation to their definitions. Write the correct letter in the blank.

_____ 1. The area in which two or more ecosystems overlap

_____ 2. A marker or structure built to signify the importance of a person, place, or event

_____ 3. An area of land set aside to protect the habitat

_____ 4. For or by the whole country

_____ 5. Laws governing the construction and use of property

_____ 6. A group of living and non-living elements that work together in a natural community

_____ 7. An area of land set aside for recreation

a. biosphere
b. ecosystem
c. ecotone
d. monument
e. national
f. park
g. public
h. reserve
i. sanctuary
j. zoning

OBJECTIVE 2

Select from a list roles of national parks. Write an "X" in the blank before each role of national parks.

_____ 1. Providing income for the government

_____ 2. Preserving natural wonders

_____ 3. Preserving and interpreting history

_____ 4. Protecting livestock using public lands

_____ 5. Protecting natural forests, woodlands, etc.

May be photocopied for student use

_____ 6. Providing recreational areas

_____ 7. Protecting wildlife

_____ 8. Conserving soil

_____ 9. Providing research areas

_____ 10. Ensuring access for all citizens

OBJECTIVE 3 **List careers associated with parks and recreation.** List ten careers in the spaces below.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

OBJECTIVE 4 **Discuss how land use and management affect parks and recreation.**

1. What are some of the demands on available land?

____

____

____

____

____

May be photocopied for student use.

2. How are parks and recreational areas affected by demands on land use?

3. Why are laws controlling land use important?

OBJECTIVE 5 **Choose the word or phrase that completes statements about ecosystems.** Write the correct letter in the blank.

_____ 1. Perhaps the clearest example of an ecosystem is

a. a zoo
b. the Earth
c. a city or town
d. an aquarium

_____ 2. A forest ecosystem might include trees, birds, rodents, predators, soil, moss,

a. humans, sunlight, insects, and rocks
b. insects, sunlight, rain, and rocks
c. ponds, sunlight, insects, and rocks
d. humans, sunlight, ponds, and insects

May be photocopied for student use.

_____ 3. Ecosystems begin and end at

a. roads, streams, or other natural barriers
b. clear, distinct points determined by wildlife in the ecosystem
c. the point where one ecosystem meets another
d. unclear points that are not determined

_____ 4. In any discussion of ecosystems, the important idea is

a. ecosystems must contain humans
b. the boundaries of the system
c. ecosystem members rely on one another
d. ecosystems have no effect on the rest of the environment

_____ 5. When unwanted members of an ecosystem are removed

a. the members that are wanted are also harmed or destroyed
b. the ecosystem is improved
c. remaining members of the ecosystem grow stronger
d. they usually grow back

OBJECTIVE 6 **Select from a list true statements about ecotones.** Write an "X" in the blank before each true statement.

_____ 1. Ecotones are areas where two ecosystems overlap.

_____ 2. People make ecosystems stronger.

_____ 3. Changes to ecotones can affect both ecosystems.

_____ 4. Ecotones attract a large variety of wildlife.

_____ 5. Preserving ecotones in public areas is easy, because everyone agrees the land should be protected.

_____ 6. Ecotones attract humans.

_____ 7. Wildlife usually avoids ecotones.

_____ 8. Ecotones are often destroyed by people.

_____ 9. Preserving ecotones in public areas can be especially difficult, because different groups of people may believe the area should be used in different ways.

May be photocopied for student use.

_____ 10. Ecotones are the areas between two separated ecosystems.

NOTE: Objectives 7-10 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

NATURAL RESOURCES – PARKS AND RECREATION XIV

OBJECTIVE 1

1. c
2. d
3. h
4. e
5. j
6. b
7. f

OBJECTIVE 2

2, 3, 5, 6, 7, 9, 10

OBJECTIVE 3

Answers should include any ten of the following:

- Superintendents
- Business managers
- Accountants
- Tour guides
- Forest rangers
- Firefighters
- Map makers
- Game wardens
- Botanists
- Photographers
- Film makers
- Statisticians
- Animal caretakers
- Hotel/restaurant managers and staff people
- Construction workers
- Architects
- Historians
- Surveyors
- Security workers
- Pilots
- Naturalists
- Computer programmers
- Public relations specialists

OBJECTIVE 4

1. Answers should include at least three human demands, such as industry housing, highways, schools, etc. Answers should also include that population growth will make these demands greater. Finally, answers should mention that different groups of people make different demands on the land.

2. Answers should include a discussion of different demands by different groups, including environmental, recreational, and other groups. Some mention of the goals of the park being important should be included.

3. Answers should include that the use of one piece of land can affect other areas and other people.

OBJECTIVE 5

1. d
2. b
3. d
4. c
5. a

OBJECTIVE 6

1, 3, 4, 6, 8, 9

OBJECTIVE SHEET

NATURAL RESOURCES—WILDLIFE AND FISHERIES

XV

INTRODUCTION

Agriculture's role in protecting the environment is important. By protecting the soil, water supply, food supply, and atmosphere, agriculture can actually help heal damage to fragile ecosystems. However, agriculture must also help protect the natural resources we currently possess.

Just as protecting parks and other natural resources is complicated by technology, protecting wildlife may conflict with construction, land management, and agriculture. Knowing how best to promote wildlife, manage our resources and use wisely, and protect our animals and fish presents many difficult, yet important, challenges.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify the value of wildlife and fisheries, the importance of protecting endangered species, the effects of wildlife on land and agriculture, and industries related to protecting wildlife. The student will be able to demonstrate these competencies by completing assignment sheets and a written test with a minimum 85% accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with wildlife and fisheries to their definitions.
2. Discuss the value of wildlife protection.
3. Select from a list true statements about endangered species.
4. Choose the word or phrase that completes statements about fisheries and the fishing industry.
5. Select from a list true statements about the co-existence of animals and technology.
6. Choose the word or phrase that completes statements about zoos.
7. Choose the word or phrase that completes statements about the forage industry.
8. List negative effects of wildlife.

9. Complete a graph showing the population of an endangered animal and corresponding changes in the environment. (Assignment Sheet 1)
10. Make a chart on fish found in your area. (Assignment Sheet 2)
11. Calculate the amount of forage required to support the number of animals needed to feed one mountain lion for a year. (Assignment Sheet 3)

PREPARATION

- Obtain materials to supplement the unit.

  NOTE: See Suggested Resources.

- Review the instructional outline for this unit. Modify time frames to suit class needs and plan activities for each class period.

- Study the specific objectives to determine those you will cover in your presentation. Decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.

- Invite local game wardens, zoologists, zookeepers, animal researchers, or other related experts to discuss their careers and the importance of wildlife.

- Invite local fishery representatives to discuss their business and its future.

- Arrange to have all materials and supplies necessary to complete the assignment sheets.

- Remind students that information in boxes is not testable.

DELIVERY

Objective 1: Match terms associated with wildlife and fisheries to their definitions.

- Have students list terms that come to mind when you say "wildlife" and terms that come to mind when you say "fisheries."

- Have students discuss how the media has affected their knowledge of wildlife and fisheries.

- Have students predict changes in wildlife and fisheries they will see in the future.

Objective 2: Discuss the value of wildlife protection.

Objective 3: Select from a list true statements about endangered species.

- Have students collect newspaper and magazine articles about preserving wildlife and endangered species.

- Have students debate the importance of preserving wildlife. Have them discuss when preservation is important and when it isn't. Use the following situations as topics for discussion:

  — If saving a bird means preventing industrial growth, should the bird be saved? What if it means widespread unemployment? What if there are only two or three of the birds left?

  — If a fish is only found in one small stream, should a dam be allowed to flood the area?

  — Should insects be considered wildlife and be protected?

  — Should endangered animals be preserved in public spaces, or relocated to private, protected areas?

- Discuss government rewards for predator kills, including wolf and bobcat eradication programs. Have students discuss how these policies affected settlers, agriculture, and the animals themselves.

- Have students identify species the government allowed, even encouraged, to reach near-extinction levels and why these policies were supported.

- Use the list of endangered and threatened species in Oklahoma in Extensions & Options to illustrate that preserving species has to begin at home.

- Use Student Supplements 1 and 2 to illustrate objective information.

- Have students complete Activity Sheet 1.

- Have students complete Assignment Sheet 1.

Objective 4: Choose the word or phrase that completes statements about fisheries and the fishing industry.

- Discuss how old the fishing industry is. Have students research and report on ancient fishing methods.

- Have students identify nations that rely on fish as a major food source. Have them collect newspaper and magazine articles discussing the nutrition of fish.

- Have students taste dried fish.

- Have students identify areas of America that rely on the fishing and seafood industries.

- Have students list fish and seafood they have eaten.

- Have students complete Assignment Sheet 2.

Objective 5: Select from a list true statements about the coexistence of animals and technology.

- Have students identify examples of wildlife and technology coexisting.

- Invite representatives of the oil industry to discuss how this important Oklahoma industry works to protect wildlife.

- Have students predict how industries in the future will protect wildlife.

- Have students suggest ways space technology will benefit wildlife.

- Have students read and discuss Student Supplements 3-5.

Objective 6: Choose the word or phrase that completes statements about zoos.

- Have students visit a nearby zoo.

- Have each student write to a different zoo, asking about the zoo's purpose. Have them compare answers.

- Have students research the history of zoos. Have them discuss why ancient zoos were built.

- Have students build models of futuristic zoos. These may include fantastic creatures from space, ancient creatures obtained through time travel, etc.

- Have students complete Activity Sheet 2.

Objective 7: Choose the word or phrase that completes statements about the forage industry.

- Have students list ways the forage industry affects Oklahoma.
- Have students discuss why the forage industry is important to protecting wildlife.
- Have students complete Assignment Sheet 3.

Objective 8: List negative effects of wildlife.

- Have students list wildlife that negatively affect agriculture. Make sure they list small animals as well as large.
- Have students list wildlife that negatively affect agriculture in other countries. Examples might include tigers and elephants.
- Have students discuss how we handle the effects of wildlife on agriculture. Have students suggest alternatives.
- Have students list ways wildlife and plants counteract negative effects of wildlife. For example, crows eat grain but are themselves eaten by predators.

APPLICATION

Objective 9: Complete a graph showing the population of an endangered animal and corresponding changes in the environment.

- Use this assignment to illustrate the complicated balance of nature and how changes to agriculture, atmosphere, etc. affect living things.
- Have students list changes in the environment that affect animals.
- Have students list things they do each day that might affect wildlife.

Objective 10: Make a chart on fish found in your area.

- Invite a representative of the Department of Wildlife Conservation to discuss fish found in your area.
- Have students tour a local fish farm or related industry.
- Have students research growth in the fish industry in the past five years.

Objective 11: Calculate the amount of forage required to support the number of animals needed to feed one mountain lion for a year.

- Have students chart an area near your school large enough to support a mountain lion. Be sure the area includes habitats that would also support deer.

- Based on these assignments, have students list steps that could be taken in your area to protect wildlife.

EVALUATION

Pretest

- Give written test as pretest.

- Determine individual study requirements.

- Counsel students individually on pretest results and study requirements.

- Modify material in unit or create supplementary materials for individual students as required.

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.

- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- Oklahoma Department of Vocational and Technical Education, Resource Center, 1500 W. Seventh Avenue, Stillwater, OK 74074. The following materials are available to Oklahoma teachers on a free-loan basis.

  Aquaculture: Farming the Waters. Covers production, marketing, and processing of catfish, crayfish, and trout as well as nutritional, environmental, and financial questions about aquaculture, 1989. (30 minutes, color, VHS)

  Year of the Eagle. Traces the life cycle and discusses problems contributing to the drastic reduction in population. 1986. (27 minutes, color, VHS)

- *The Responsible Hunter*, American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605. Covers ethical hunting, safety rules, and the relationship between hunting and wildlife. (23 minutes, color, VHS)

Print Media

- Hunter Education Coordinator, Oklahoma Department of Wildlife Conservation, 1801 N. Lincoln Blvd., Oklahoma City, OK 73105-4998, 405-521-4650. Offers the following brochures:

  Firearms Safety in the Field, on the Range, and at Home

  Oklahoma Hunter Safety Education Program

- *Make Room for Monsters...and Wildlife on the Lane.* Soil and Water Conservation Society, 7515 NE Ankeny Road, Ankeny, IA 50021-9764. Explores the relationship between humans and wildlife and methods to attract wildlife. Sixteen page booklet and teacher's guide.

- Oklahoma State University Cooperative Extension Service and Agricultural Experiment Station, Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550. Several fact sheets and publications are available from this organization or from your county extension agent.

Software

- *Micro-Tutor Series, Conservation.* American Association for Vocational Instructional Materials, 745 Gaines School Road, Athens, GA 30605. Software produces customized tests and quizzes. Covers forestry, wildlife, soil, and water conservation. For use on IBM and compatible.

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- *Improving Your Acres for Wildlife*. Oklahoma Department of Wildlife Conservation: Oklahoma City, 1984.

- Jenkins, Alan. Assistant Director, Sutton Avian Research Center. Interview, January, 1992.

- Masters, Ron. Oklahoma State University Extension Wildlife Specialist. Interview, January, 1992.

- *National Parks*, July/August, 1991.

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- *Oklahoma Game Birds*. Oklahoma Department of Wildlife Conservation.

- *Oklahoma's Winter Birds*. Oklahoma Department of Wildlife Conservation.

- Phillips, Rob. Spokesman, Phillips Petroleum Co. Interview, January, 1992.

- Pier, J.D. Oklahoma State Department of Wildlife Hunter Safety Specialist. Interview, January, 1992.

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- *Why Save Endangered Species*. U.S. Department of the Interior, Fish and Wildlife Service.

OKLAHOMA'S ENDANGERED AND THREATENED SPECIES

Animals	Scientific Name	Status
Whooping Crane	*Grus americana*	Endangered
Bald Eagle	*Haliaeetus leucocephalus*	Endangered
Peregrine Falcon	*Falco peregrinus*	Endangered
Interior Least Tern	*Sternus antillarm*	Endangered
Black-capped Vireo	*Vireo atricapillus*	Endangered
Red-cockaded Woodpecker	*Picoides borealis*	Endangered
American Burying Beetle	*Nicrophorus americanus*	Endangered
Gray Bat	*Myotis grisescens*	Endangered
Indiana Bat	*Myotis sodalis*	Endangered
Ozark Big-eared Bat	*Plecotus townsendii*	Endangered
Ouachita Rock Pocketbook Mussel	*Arkansia wheeleri*	Endangered
Piping Plover	*Charadrius melodus*	Threatened
Ozark Cavefish	*Amblyopsis rosae*	Threatened
Neosho Madtom	*Notorus placidus*	Threatened
Leopard Darter	*Percina pantherina*	Threatened
American Alligator	*Alligator mississippiensis*	Threatened

Plants	Scientific Name	Status
Eastern Prairie Fringed Orchid	*Platanthera leucophaea*	Threatened
Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened

INFORMATION SHEET

NATURAL RESOURCES–WILDLIFE AND FISHERIES

XV

OBJECTIVE 1

Match terms associated with wildlife and fisheries to their definitions.

- **aquaculture** – raising fish and underwater plants for sale and profit
- **endangered** – in danger of becoming extinct
- **extinct** – no longer in existence
- **fish farm** – a business in which fish are raised and sold
- **fishery** – a place where fish are caught; the business of catching, packaging, and selling fish and seafood
- **game** – birds or animals hunted for sport or food; hunting is regulated
- **legend** – a portion of a map, graph, or other diagram that lists symbols used and their meanings
- **migrate** – to move from one area to another

  NOTE: Migration usually means moving with the seasons, but some species move according to other patterns.

> Armadillos are found throughout Oklahoma today, but were rarely found north of the Red River earlier in this century. This migration into Oklahoma is part of a long, slow movement north. In fact, when the Battle of the Alamo was fought in 1836, there were no armadillos in Texas—they were all south of the Rio Grande.

- **nongame** – birds and animals which are not trapped or hunted; hunting is prohibited
- **prosthetics** – artificial body parts
- **threatened** – suffering reduced populations
- **wildlife** – all wild animals and birds

OBJECTIVE 2

Discuss the value of wildlife protection.

Much of the wildlife we come in contact with is protected by laws to protect them from extinction. They are protected by seasonal hunting laws and limits because they are valuable and important to our way of life. But what about animals that are not hunted or for other reasons do not fall under the protection of such laws? Other ethical questions also arise concerning animal protection such as whether all species should be protected or just ones we feel are important.

Many people feel the wise use of resources, or stewardship, is an important reason for all species to be protected. Those believing in stewardship feel that man does not have the right to cause the extinction of other species.

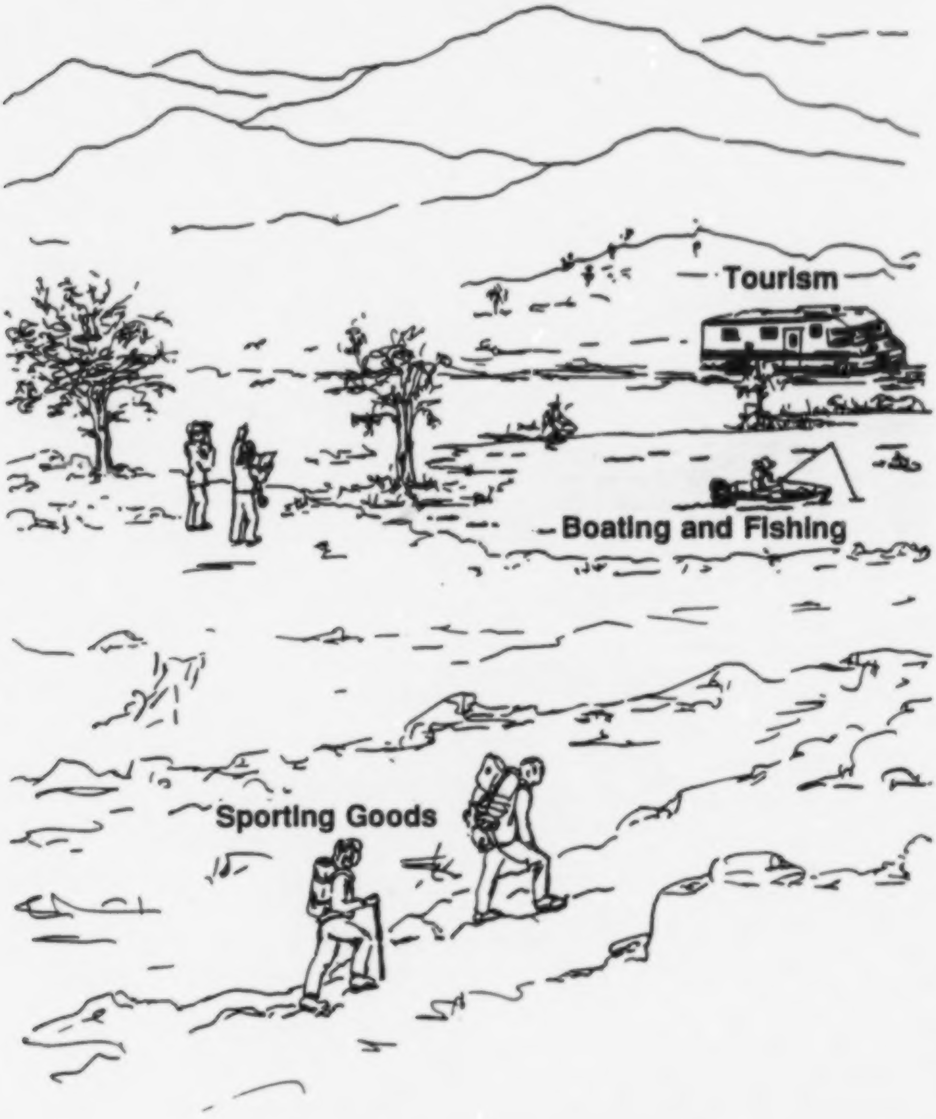
Others believe wildlife should be protected because it fills a cultural and recreational need. In 1980, the U.S. Council on Environmental Quality explained:

> "Perhaps this ancient kinship [between humans and all other living organisms] explains why it is essential to the psychological well-being of so many people to collect, hunt, read about, watch, photograph, or be surrounded by diverse living things. There would be little excitement in only one kind of flower, bird, or butterfly; their fascination lies in their different sizes, shapes, colors, sounds, behaviors, and abundance, their complexity, and their freedom."

Certainly the millions of Americans who participate in bird watching, hiking, hunting, nature photography, fishing, and other wildlife-related hobbies agree.

With all this interest in wildlife, protecting it also becomes economically important. Businesses and individuals profit from tourism, bait and tackle sales, photography, hunting supply, clothing sales, and other industries related to people enjoying wildlife. In some areas, farmers and ranchers lease land for recreational use such as camping, hunting, and fishing.

WILDLIFE LEADS TO PROFITS FOR MANY INDUSTRIES



Protecting wildlife also protects the ecosystem. Animals disperse seeds, absorb and break down substances, and occupy a place in the food chain. Each time a species is reduced, the ecosystem suffers.

Wildlife can serve as an early-warning system for people's health. When problems arise in the environment, the effect is normally first seen on the low end of the food chain. Since humans eat at the top of the food chain, what affects animals will eventually affect us. By watching wildlife, we can begin to identify problems and correct them.

1026

Technology continues to find new uses for many animals. For examples, sea urchin eggs are now used to test the risk of birth defects from experimental drugs, rare bird species are being used to track the effect of pollution on the Amazon Rain Forests, butterfly species are being used in cancer research, and new anti-cancer agents are the result of research on Jamaican sponges.

ANIMAL ALARMS

For years, miners kept canaries in mines. When odorless, but toxic, fumes filled the mines, the canaries died. The miners could watch the canaries and know when they needed to escape.

Animal alarms have alerted us to dangerous conditions in our modern world. Toxic effects of DDT were first noticed in eagles and falcons. Pollution in Lake Erie received national attention only after industrial waste containing heavy metals, dumped in the lake for years, caused massive fish kills. Today, one method of monitoring toxic waste dump systems is to observe the behavior and growth patterns of rodents and compare them to normal patterns.

Finally, protecting the diversity of species protects the continuation of many related species. For example, one species of cattle may be more resistant to a viral disease than another species. The species which is more resistant is more likely to survive if there is an outbreak of the disease, thus protecting the species from reduction.

OBJECTIVE 3 **Select from a list true statements about endangered species.**

Nobody knows how many animals are extinct. In fact, nobody knows how many species of animals are alive.

To date, about 47,000 vertebrate, 750,000 insects, and 470,000 invertebrates and microorganisms have been identified. An additional 440,000 plant species have been identified, totalling about 1.7 million known life forms on Earth. However, experts believe anywhere from 5 to 30 million life forms exist. That's a minimum of 3.3 million life forms on Earth today that have not been discovered and identified.

Even so, experts are working hard to protect the species known to be endangered. In 1973, the American government began to catalog endangered and extinct animals. In 1988, the U.S. Fish and Wildlife Service had designated 1,000 species as endangered. Independent groups, however, have designated as many as 4,589 animal species as endangered.

Most species have been endangered by habitat destruction, pollution, or diversion of water. Some species, such as the buffalo, alligator, and timber wolf have become endangered because of over hunting in the past.

Hunters are not the enemy of wildlife. In fact, hunters and hunting organizations have led the fight to protect wildlife areas and many species. However, the key is responsible hunting. Hunting only during season, protecting the natural habitat, and practicing safety procedures are all part of responsible hunting practices.

About two percent of the species which our government has designated as endangered have actually become extinct. Only five species have increased their population enough to be removed from the list: the American alligator, the Palau dove, the Palau fantail, the Palau owl, and the brown pelican.

In many cases, a species will dwindle until it reaches the endangered species list, then population will begin to grow. Once an animal is on the list, it's natural habitat cannot be disturbed and it cannot be hunted. Also, at that point, research funds become available. Many species were virtually unknown before reaching the endangered species list, but were thoroughly researched once they were added to it and funds were made available.

Endangered species status has been used as a ploy to control or limit construction. People opposed to road or industrial construction have attempted to prove the construction will be harmful to some animal, insect, or plant in the area, hoping it will stop construction. However, many conservationists are concerned that using this defense too often will give conservationists a bad reputation and would like to see it limited only to situations where the objective is saving the organism—not stopping the construction.

OBJECTIVE 4 **Choose the word or phrase that completes statements about fisheries and the fishing industry.**

Fishing is one of the oldest businesses in the world. Ancient people used nets to catch fish and shellfish. In nearly every part of the world fish were smoked, dried, and eaten.

Today, the fishing industry is one of the fastest growing in America. Many consumers are buying and eating more fish because of its health benefits. Sport fishing remains one of America's favorite pastimes. Like livestock, a ready market for fish byproducts exists and is growing.

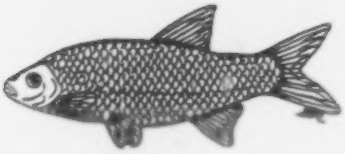
Fishing and farming can go hand in hand, sometimes even sharing the same space. In Louisiana, flooded rice patties produce both rice and crawfish. Indoors, tilapia (a commercial fish) have been raised along with plants in hydroponic farming tanks.

In coastal areas, fishing is often one of the region's major industries. Fishing boats and crews use netting systems and traps to catch large amounts of fish and seafood. They are usually sold immediately to processors or distributors. In some areas the fish are hatched in specialized hatcheries and raised until they reach a certain size. The young fish are released into the public fishing waters to grow, then are caught and sold.

In Oklahoma, the fishing industry has two main components. Sport fishing brings tourists to Oklahoma, supports a large bait and tackle manufacturing industry, and supports the many public and private fishing lakes and ponds in Oklahoma.

The second component of Oklahoma's fishing industry is the fishery, or fish-raising, industry. It is the fastest-growing alternative agriculture in the nation. Fish are bred, grown, and harvested in ponds or tanks. These fish can be sold directly to consumers, processors, grocers, and restaurants. They are also used to stock lakes, ponds, and fishing-for-fee operations.

The fish and aquatic animals most commonly raised in Oklahoma include tilapia, channel catfish, frogs, striped bass, bait fish such as shiners and minnows, and sport fish such as bass and bluegill. Crawfish, paddlefish (spoonbill), and trout are also raised but are less common.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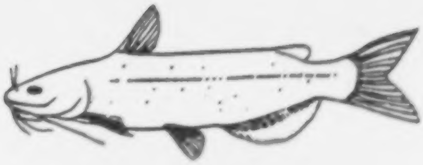
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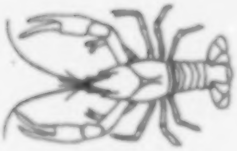
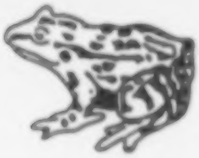
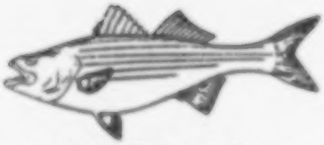
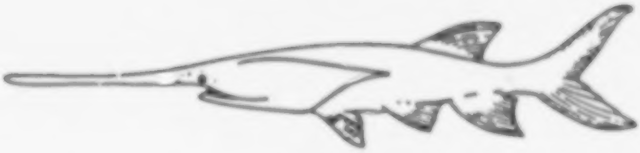
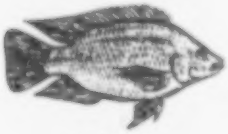
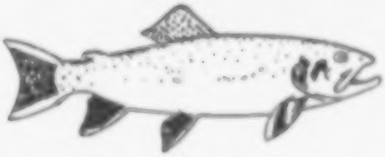

Crawfish


Frog


Hybrid Striped Bass


Paddlefish


Tilapia


Trout

Adapted with permission of Oklahoma State University, Cooperative Extension Service.

Fish Farm Systems

- **Cage systems**

  In cage systems, floating cages house the fish. They are fed food pellets. This system is inexpensive, but requires careful observation and proper pond conditions. Disease can easily spread through a cage system. Small, deep, and very green ponds cannot be used. Production must be kept low, or water will become deoxygenated and the fish will die.

- **Ponds**

  Pond culture is usually the most economical method of fish farming. Ponds should be specially built with flat bottoms for fish farming. The water source must provide adequate water. Here, again, water can become deoxygenated if the pond is overpopulated.

- **Continuous flow systems**

  Continuous flow systems include ponds, tanks, or other containers through which new water continuously flows. The large amount of water necessary for these systems makes them too expensive for most producers, unless springs, streams, or other continuous sources of water are available.

- **Recirculating systems**

  Recirculating systems are similar to continuous flow systems, but water is filtered and reused. These systems are still considered experimental. Some filters are destroyed by fish-disease treatments. In many cases, the fish raised in these systems have an unpleasant taste. However, this is considered the system of the future.

OBJECTIVE 5

Select from a list true statements about the co-existence of animals and technology.

In industries such as fish farming, technology has been used to make wildlife profitable. Technology has also been developed to protect wildlife. Construction technology today is designed and operated with wildlife in mind.

For example, when many large dams were built in the northwestern United States, it was important that salmon not be cut off from their spawning grounds. Engineers designed fish ladders, gradually inclining troughs of water beside the dam, that allow fish to swim upstream without being harmed.

Photo courtesy of U. S. Fish and Wildlife Service and H. B. Carr.

Another example of technology co-existing with wildlife is the Alaskan pipeline. When the pipeline was built, it blocked caribou migration paths. Once again, engineers devised a way to meet the needs of both technology and wildlife, this time by constructing platforms that allow the caribou to travel over the pipeline.

Technology and new scientific methods allow us to learn more about the air, water, and soil around us, to test and monitor it more carefully, and to learn how to clean and protect it. By studying the relationship between wildlife and the environment, we also learn about our role in nature.

Radio transmitters and video monitoring devices help scientists trace the movement and habits of many species of wildlife. Human medical technology also aids wildlife. For example, by using plastic surgery and prosthetics, birds injured in the wild have been fitted with false legs and beaks. Injured wild animals can be put to sleep and treated in modern surgery rooms. Even dental care is available for wildlife!

Technology doesn't have to be complex to work with wildlife. In Oklahoma, the right-of-way along some state highways is left unmowed during nesting seasons. In many cases, this is the only available cover for ground-nesting birds.

OBJECTIVE 6

Choose the word or phrase that completes statements about zoos.

For many people, the best way to see wildlife is to visit the local zoo. Zoos are not new. The first known zoo was built in China more than 4,000 years ago and was called "The Park of Intelligence."

In the past, zoos were little more than displays of exotic animals. Animals were caged or housed in displays that were nothing like their native habitats.

Today's zoos, however, do much more than display animals. They teach people about the Earth, its environment, and the role of wildlife. Animals are housed in displays as similar to their native habitat as possible. Lighting, food, temperature, and plants are as close to the natural environment as possible.

Modern zoos benefit endangered species. Not only do they raise public awareness about threatened and endangered species, but zoos also protect and care for surviving animals. They also mate them in an attempt to continue the species.

OBJECTIVE 7

Choose the word or phrase that completes statements about the forage industry.

Wildlife affects many industries, including some that might seem totally unrelated. One example of this is the forage industry. Forage is the grass and other plants grown to feed livestock. Over time, farmers and ranchers have changed Oklahoma's environment and these changes have directly affected Oklahoma wildlife. At the same time, changes in the wildlife patterns have affected the plants growing in Oklahoma. Now the forage industry is adapting to changes in the environment.

Oklahoma was once part of the Great Plains. This wide area of America was formed by four forces: climate, drought, fire, and grazing. The natural relationships between these four elements was destroyed when the area was settled. Farmers suppressed fire, dammed streams, and removed many native animals. At that time, people believed that men could change the world as they saw fit.

Today, the wide-open areas are vastly different. Buffalo grazed the tall prairie grasses until farmers found the land more profitable for grazing livestock. Rather than raise farm crops, they let the native plants "grow back." But since the natural cycles of fire, drought, and migratory herd grazing were disturbed, the same grasses did not return. While some species are being reestablished in protected areas, some are lost forever.

The red cedar, growing through most of Oklahoma, was once found only along some river banks. The natural fire cycle destroyed cedars growing other places. Once burned below the lowest branch, red cedar does not grow back. Today, the cedar grows in most fields, changing the habitat and the wildlife species the area can support. Its growth has increased to the point that, in some areas, the red cedar has become a pest.

Changes in the environment have also affected the wildlife living in Oklahoma. Grizzly bears, timber wolves, and many other animals have disappeared from Oklahoma because of these changes.

HOW MUCH CHANGE?

Okay, suppose things change a little. So what? It can be amazing what even a small change makes.

McCurtin County Oklahoma houses a population of the red-cockaded woodpecker. This bird is the only woodpecker that excavates a cave in a living tree.

When a fire-exclusion policy was enacted in the nature preserve housing the woodpeckers, shrub and grass growth increased within the tree stands. The woodpeckers prefer a clear area, as would be produced by fire cycles. As a result the woodpecker population began to decline. The population in 1987 was half that found in 1977. In 1991, it was half of what it was in 1987.

The Oklahoma population wasn't the only one in the country; it wasn't even the largest, so this decline received little attention. But, when Hurricane Hugo hit the North Carolina coast, the habitat of the largest population was destroyed. Only small populations, like the one in Oklahoma, kept the entire species from being wiped out. Suddenly, that simple fire policy in one Oklahoma County became very important. The policy was enacted to protect the woodpecker but it actually reduced the woodpecker population. Experts and local citizens disagree over the policy, although it remains in effect.

OBJECTIVE 8

List negative effects of wildlife.

Wildlife has many benefits, but there are also some negative effects. Because of these negative effects, wildlife is sometimes trapped or destroyed. Some of the negative effects include:

- Damage to crops and other plants
- Killing livestock and other domesticated animals

- Danger to people
- Competition with other animals for food, water, and other necessities
- The spread of disease

NOTE: Animals can spread disease, not only to other animals, but also to humans.

OKLAHOMA'S HUNTER SAFETY EDUCATION PROGRAM

In 1987, Oklahoma adopted a mandatory hunter education program for all persons born after January 1, 1972. This means that persons born after this date must complete the ten hour course before they can purchase a hunting license.

The course is designed to provide basic instruction in such areas as firearm safety, hunter responsibility, game management, bow hunting, muzzle-loading firearms, survival, wildlife identification, and Oklahoma game laws and regulations.

The courses are taught by certified game rangers and volunteer hunter education instructors. You may find out about courses offered in your area by contacting a game ranger, the Oklahoma Department of Wildlife Conservation, county conservation boards, FFA clubs, or scouting organizations.

Most of the courses are offered in the early fall prior to the major hunting seasons. Some may be offered in the spring before the spring turkey season.

The hunter education course must be ten hours long to meet the minimum requirements although some may be longer if field demonstrations are held. There is no charge for the instruction or materials.

REINTRODUCING BIRDS OF PREY

Few sights are as inspiring as that of an eagle in flight. Eagles have been symbols of strength and bravery for centuries. Knights painted them on their shields, Native Americans wore their feathers and danced in their honor. When America won its independence, the eagle was chosen to symbolize America's spirit.

But today, the Bald Eagle is an endangered species. Habitat destruction, as wild areas were cleared and used by people, reduced the eagle population. Then DDT was introduced into the environment.

DDT is a pesticide, now unavailable in America, but still used in some parts of the world. As DDT was sprayed on plants, it also spread into the water system. Traces of the DDT remained in the animals that ate the plants or drank the water. Predators ate those animals and absorbed the DDT. At each level, the DDT was not only retained, but was concentrated. By the time the DDT reached the top of the food chain, it was a deadly concentration.

Eagles, at the top of the food chain, are sensitive to the effects of DDT. Female eagles affected by DDT could lay eggs, but the shells were very thin. When the birds sat on the eggs to incubate them, the eggs were destroyed. The eagle population dropped because of the thin-shelled eggs.

As DDT began to work its way out of the system, this trend was reversed, but very slowly. Some researchers worried that the eagle population would not be able to recover. As Alan Jenkins, Assistant Director of the Sutton Avian Research Center in northeastern Oklahoma explains, "The environment is changing so fast. If we don't save them now, it might change so much, we won't be able to save them."

To save the eagles, the Sutton Avian Research Center staff began a repopulation program. Each year, they traveled to Florida and targeted eagle nests. When eggs were laid, the staff removed the eggs from the nests. Because Florida has a very long nesting season, 80% of the eagles laid a new set of eggs. This almost doubled the number of eggs laid each year. The removed eggs were shipped back to Oklahoma and incubated by Bantam chickens.

When they hatched, the hatchlings were kept wild. To do this, the hatchlings are not allowed to see humans. Research indicates that if they see humans, they imprint on them. That is, the eaglets believe the humans to be their parental model and pattern their behavior after humans rather than their own species. To feed the hatchlings, workers use a puppet that looks like a mother eagle. The researchers watch hatchlings through a one-way mirror.

When the hatchlings are 8 weeks old, they are taken to the release area and placed in cage on top of a pole. They are fed in the dark, to prevent much sight of humans. No other human contact is made.

At eleven weeks, the bars of the cage are removed. The birds fly free, but return to the cage for food for about two months. Then they migrate north.

It takes 4-5 years for the eagles to reach maturity and reproduce. The program began in 1985 and ended in 1992. By the end of the program, releases had been made in five states and some of the first birds released were nesting and raising their own young. The only nesting pair in Oklahoma in 1991 was a pair released by the Sutton Avian Research Center. The Research Center plans similar programs for other breeds, particularly prairie birds.

Mr. Jenkins suggests that students planning to enter agriculture remember the importance of wild lands, even small fringes surrounding crop areas.

If you are interested in pursuing a career in aviary work, concentrate on science, biology, and math classes.

MOUNT ST. HELENS

Everyone knew it was coming. Scientists had been monitoring the Mount St. Helens Volcano in Washington for years and knew an eruption was coming. For months, residents in the volcano area had been urged to move.

But, even with all the warnings, 61 people chose to remain in the volcano area and were killed when it erupted May 18, 1980.

The main eruption (there were several minor eruptions before May 18 and at least 24 since that time) began when an earthquake shook the volcano. A tremendous avalanche followed. Debris from the avalanche fell into Spirit Lake on the northeast slope and raised the bottom of the lake by almost 300 feet. It covered 24 square miles of the Toutle River valley, at the base of the volcano, in a blanket of rubble 150 feet thick. The avalanche also set off a blast of gasses. This blast devastated 230 square miles and toppled trees almost 20 miles away. It was only then that the main eruption occurred. The ash from the main eruption shot over 12 miles into the air, completely blocked the sun from cities and towns throughout Washington, and dropped more than 2 inches of ash throughout Washington and Idaho. Ash fell as far away as Oklahoma.

110,000 acres of the area is now part of the Mount St. Helens National Volcanic Monument. Researchers have been able to study the life cycle of the volcano, the rebirth of the forest, and the return of wildlife.

One of the most important contributions of wildlife has been mixing the pumice and ash into the soil, creating a rich, fertile growing medium. Pocket gophers returned quickly, and were joined in this task by deer mice, ants, and beetles. Water in Spirit Lake was deoxygenated by the debris and plant death, but has recovered quickly. Frogs, salamanders, and crustaceans were the first water-animals to return.

Experts debated whether to restock rivers and lakes. Although they agreed the waters could support the fish within ten years, researchers wanted the chance to observe the natural return of fish species.

The decision about which lakes and rivers were stocked and which were left for research was made by state officials concerned about protecting the important fishing and tourist industries.

THE VALDEZ

On March 23, 1989, the Exxon Valdez, an oil supertanker filled with more than 53,000,000 gallons of Alaskan crude oil, left port at Valdez, Alaska. The tanker, under control of the harbor pilot, cleared the Prince William Sound. When Captain Joseph Hazelwood took command, he radioed the Coast Guard that they would be leaving the approved traffic lane to avoid ice chunks from the nearby Columbia Glacier. This was not an unusual request and permission was granted.

After receiving permission, Capt. Hazelwood put the ship on autopilot and left the bridge, leaving his third mate in charge. The third mate was not a certified pilot. Capt. Hazelwood instructed the pilot to turn the tanker after they passed Busby Island.

However, the autopilot system, programmed for open ocean sailing, began accelerating the ship. When they passed Busby Island, the third mate attempted to turn the tanker, but could not turn quickly enough to avoid running aground on Bligh Reef. The tanker was not seriously damaged; however, as the third mate tried to move it away from the shore, the tanker hit a second section of the reef. This second impact ripped open all 11 of the cargo tanks and spilled more than 10.9 million gallons of oil into the Prince William Sound.

Over the next few days, the largest oil spill in history, flowed through the Alaskan Gulf, polluting more than 1,000 miles of Alaskan coast. The wave motion mixed the oil with sea water, forming a thick layer of pollution that suffocated or drowned fish, sea otters, birds, and other wildlife. Charges were filed against Capt. Hazlewood, Exxon, and Alyeska Pipeline. Because charges were filed, official animal counts, environmental impact estimates, and long-term effect research were considered evidence and have, to date, been withheld from the public. However, the National Park Service estimates that 350,000 to 390,000 birds were killed, 3,300 to 5,500 of the 20,000 sea otters were killed, and 26 archeological sites were permanently damaged or destroyed.

The National Park Service is also concerned about long-term effects. As surviving fish, contaminated by the pollutants, reproduce or are eaten, the contamination is spread through the food chain. In 1991, the Park Service estimated that the birth rate of area birds dropped by 215,000.

They also point out that the salmon industry, one of Alaska's most important, will suffer long-term effects. In 1989, the death rate of salmon eggs was 70% above normal; in 1990 it was still 50% above normal. "Gross abnormalities" were appearing in salmon larva and hatchlings. They also discovered long-term damage or loss to rockfish, herring, shrimp, mussels, clams, trout, and pollack.

GULF OF MEXICO–OIL AND FISHING

Offshore oil drilling was a controversial step. Many people feared it would destroy the fishing industry. Even today, years after offshore drilling began, many people worry about its environmental impact.

However, in Texas and Louisiana, the fishing and oil industries have become good friends. The drilling rigs slowly become covered with algae and other seawater growth. This growth attracts small fish, which attract larger fish and improve fishing.

In fact, as wells are depleted and closed down, Texas and an Oklahoma oil company, Phillips Petroleum, have begun a new program to continue the benefits of off shore drilling even after drilling ends.

Rather than spending the money to dismantle the rig, Phillips gives the money to the State of Texas. Texas officials pay to have the rig toppled, rather than dismantled. The rig, now completely underwater, continues to attract fish and improve the Gulf's important fishing industry.

Photo courtesy of Phillips Petroleum.

ACTIVITY SHEET 1

Development of:
SCIENCE SKILLS

- Introduce the assignment to the students by discussing why science skills are important.
- Discuss with them the following skills which are relevant to this task:

SCIENCE SKILLS

- Applying scientific method of inquiry
- Conducting experiments

- If students have difficulty applying scientific method of inquiry and conducting experiments:
  - Explain the importance of learning for themselves, through observation, how different factors can influence the outcome of a specific or a set of circumstances or events.
  - Explain the importance of having verifiable facts to consider.

ACTIVITY SHEET 1

NATURAL RESOURCES—WILDLIFE AND FISHERIES

XV

TEST THE IMPORTANCE OF WILDLIFE

Even the wildlife we can't see is important to us. To discover just how important, prepare two plots or windowboxes for planting, following your instructor's directions. Introduce earthworms into the soil of one plot or box, but not the other. Plant radishes in each plot or box, and compare the results.

General Science Skills
- Apply scientific method of inquiry
- Conduct experiments

ACTIVITY SHEET 2

Development of:
SCIENCE SKILLS
CREATIVE THINKING SKILLS
PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why science and creative thinking and problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  SCIENCE SKILLS

  – Investigating/applying principles of anatomy/physiology

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  – Collecting/recording information

  – Creating a finished product

- If students have difficulty investigating/applying principles of anatomy/physiology, suggest that they look at each part carefully and how it related to the parts attached to it.

- If students have difficulty collecting/recording information encourage them to be patient and to watch closely for a time before they start drawing.

- If students have difficulty creating a finished product:

  – Remind them that everyone can draw and they are not being evaluated on their skill.

  – Encourage them to try several practice sketches.

ACTIVITY SHEET 2

NATURAL RESOURCES— WILDLIFE AND FISHERIES

XV

PROMOTE WILDLIFE IN YOUR AREA

In the early 1800's John J. Audubon, a painter and naturalist born in Haiti, began selling his beautiful drawings of birds and animals. These detailed drawings brought the beauty of wildlife to the attention of Americans. His love for nature was so apparent in his drawings that many people were inspired to learn more about nature. The Audubon Society, named for him, was founded and is still a leader in efforts to protect wildlife and other natural resources.

Like Mr. Audubon, select an animal to study. It can be a wild bird, a bug, your pet dog, an animal in the zoo, a fish in your aquarium, or any other animal. Watch the animal, study its size and movements. Draw a picture of the animal, showing its behavior and appearance.

Life Science Skills
- Investigate/apply principles of anatomy/physiology

Cognitive Activities Skills
- Collect/record information
- Create a finished product

ASSIGNMENT SHEET 1

Development of:
READING SKILLS
MATHEMATICS SKILLS
SCIENCE SKILLS
ORAL COMMUNICATION SKILLS
INTERPERSONAL OR RELATING SKILLS
CREATIVE THINKING AND PROBLEM SOLVING SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why reading, mathematics, science, oral communication, interpersonal or relating, creative thinking and problem solving, and social studies skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Following written instructions
  - Interpreting graphics & symbols

  MATHEMATICS SKILLS

  - Interpreting charts & tables
  - Interpreting graphs (line)
  - Constructing graphs (line)

  SCIENCE SKILLS

  - Investigating conservation of living resources
  - Investigating issues of environmental impact

  ORAL COMMUNICATION SKILLS

  - Presenting personal opinion/viewpoint
  - Applying active listening skills
  - Distinguishing fact, opinion, & inference

- Analyzing/identifying point of view

INTERPERSONAL OR RELATING SKILLS

- Participating in group activities
- Giving/receiving feedback
- Generating ideas

CREATIVE THINKING AND PROBLEM SOLVING SKILLS

- Identifying critical elements/issues
- Identifying underlying causes
- Analyzing/synthesizing information
- Applying intuitive thinking techniques

SOCIAL STUDIES SKILLS

- Analyzing conservation/ecology issues

- If students have difficulty following written instructions:
  - Discuss the possible consequences of not following instructions precisely.
  - Have them read the instructions several times, noting the key words and ideas.
- If students have difficulty interpreting graphics and symbols, review the structure of the chart.
- If the students have difficulty interpreting charts and tables, review the purpose of the chart and define the elements.
- If students have difficulty interpreting and constructing line graphs:
  - Review the concept of the x and y axis and that the intersection is a point.
  - Use a classroom situation to construct a sample line graph.

- If students have difficulty investigating conservation of living resources and issues of environmental impact:
  - Invite discussion of current issues.
  - Assign readings in current related topics.
  - Discuss the importance of conservation and environmental impact.
- If students have difficulty presenting personal opinion/viewpoint, encourage them to support their opinions with facts, statistics, and quotes.
- If students have difficulty applying active listening skills:
  - Stress the importance of focusing on the speaker.
  - Remind student is that maintaining eye contact enhances listening ability.
  - Practice concentrating on the speaker and ignoring common distractions.
  - Suggest that they be ready to listen before beginning the communication.
- If students have difficulty distinguishing fact, opinion, & inference, review each of these terms and provide or let students provide examples. Refer to Unit III **Ag Communication**.
- If students have difficulty analyzing/identifying point of view:
  - Discuss what is meant by a point of view.
  - Create a hypothetical situation and present or have students present several points of view related to the situation.
- If students have difficulty participating in group activities:
  - Discuss carrying one's fair share of responsibilities.
  - Encourage students to treat each other with courtesy and respect.
  - Explain that everyone's input is important.
  - Stress using active listening skills.

- If students have difficulty giving/receiving feedback:
  - Explain that we learn from our mistakes.
  - Remind them to be helpful, courteous, and treat one another with respect.
  - Stress using active listening skills.
- If students have difficulty generating ideas, get them involved in sharing ideas with a creativity-enhancing exercise, such as listing all the uses for a clothespin or activities such as those recommended in a book on creativity.

  NOTE: *A Whack on the Side of the Head: How to Unlock Your Mind for Innovation* is a creativity activity book by Roger Von Oech and published by Warner Books, New York, 1983. It includes games, illustrations, exercises and self-evaluation tests.
- If students have difficulty identifying critical elements/issues, review the information noting the key words and issues.
- If students have difficulty analyzing/synthesizing information, have them review the data and identify those facts that may signal a problem.
- If students have difficulty applying intuitive thinking techniques:
  - Remind them that one idea stimulates another and they should keep going without judging or criticizing their ideas.
  - Encourage them to trust their own informed thinking.
  - Remind them that when working with others, all ideas are potential winners, and should be respected and accepted until time for discussion and evaluation.
- If students have difficulty analyzing conservation/ecology issues:
  - Have them review the information and identify critical issues.
  - Provide or recommend related resources on this or a related topic.
  - Provide a model by analyzing an issue students are already familiar with.

ASSIGNMENT SHEET 1

NATURAL RESOURCES—WILDLIFE AND FISHERIES

XV

Name ______________________ Score ____________

OBJECTIVE 9

Complete a graph showing the population of an endangered animal and corresponding changes in the environment.

INTRODUCTION

What does it take for wildlife to flourish? Water, clean air, food, shelter, the right climate, and on and on and on. Because so many different things can affect wildlife, it is hard to know exactly what causes increases and reductions in wildlife populations.

One way to find causes is to graph the wildlife population then graph changes in the environment and compare the two.

DIRECTIONS

On the following pages, you will find a chart of fish catches, a list of historical data, and a blank graph. Graph the fish catches on the graph on page 42.

1. Use colored pencils on your graph. Use a different color for each fish. If you can't use colored pencils, use a different type of line for each fish.

2. Make a legend showing what color or kind of line represents each fish.

   EXAMPLE:

Fish 1 _____

Fish 2 ....

Fish 3 -------

Fish 4 -.-.-.-.

Fish 5 --..--..

Functional Reading Skills
- Follow written instructions
- Interpret graphics & symbols

Data Analysis and Display Skills
- Interpret charts & tables
- Interpret graphs (line)
- Construct graphs

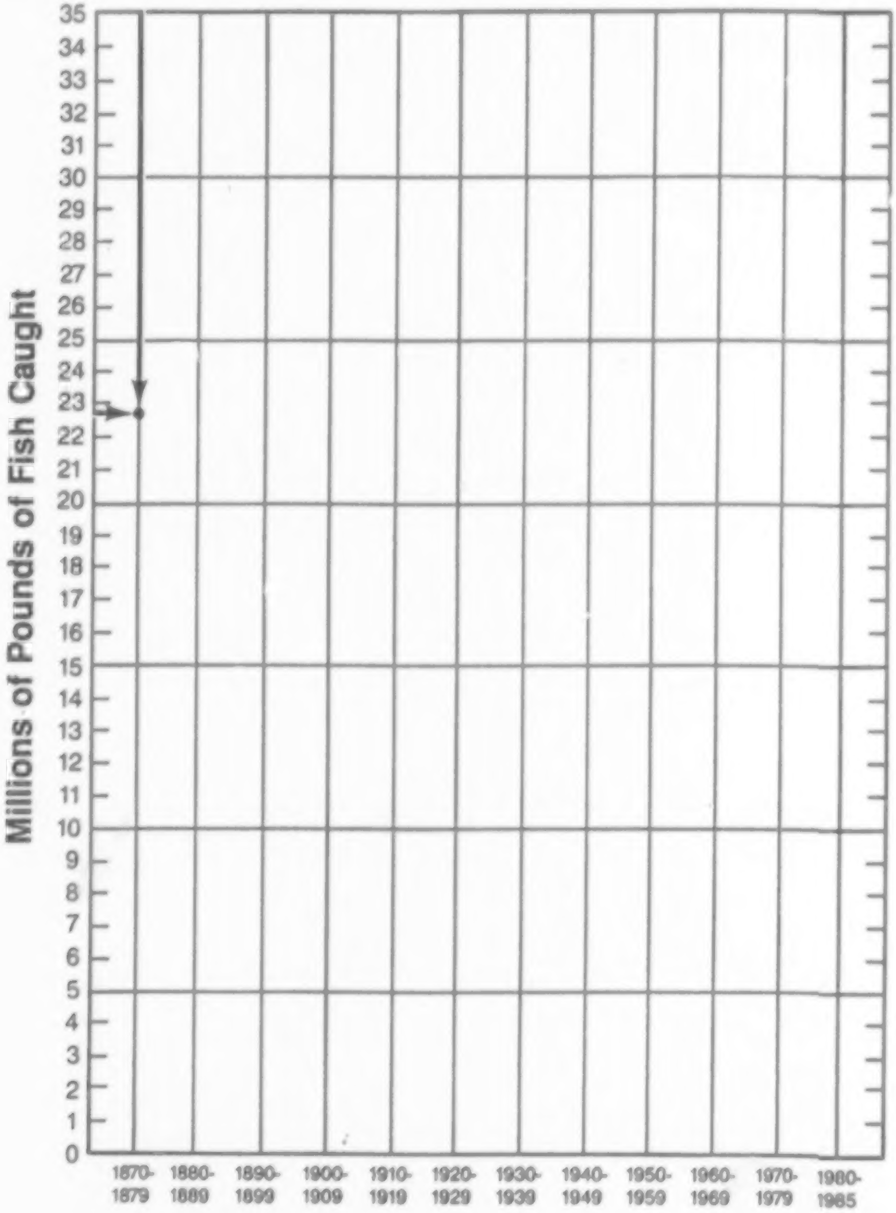
Earth Science Skills
- Investigate conservation of living resources
- Investigate issues of environmental impact

Oral Presentation Skills
- Present personal opinion/viewpoint

Listening Skills
- Apply active listening skills
- Distinguish fact, opinion, & inference
- Analyze/identify point of view

3. To graph the fish catches, find the point on the graph indicating how many of fish #1 were caught each year. Find the years along the top or bottom, then run your finger along the line until it is opposite the number of fish caught during those years. Mark that spot with a small dot.

   EXAMPLE: In 1870-1879, 22.7 million fish were caught.



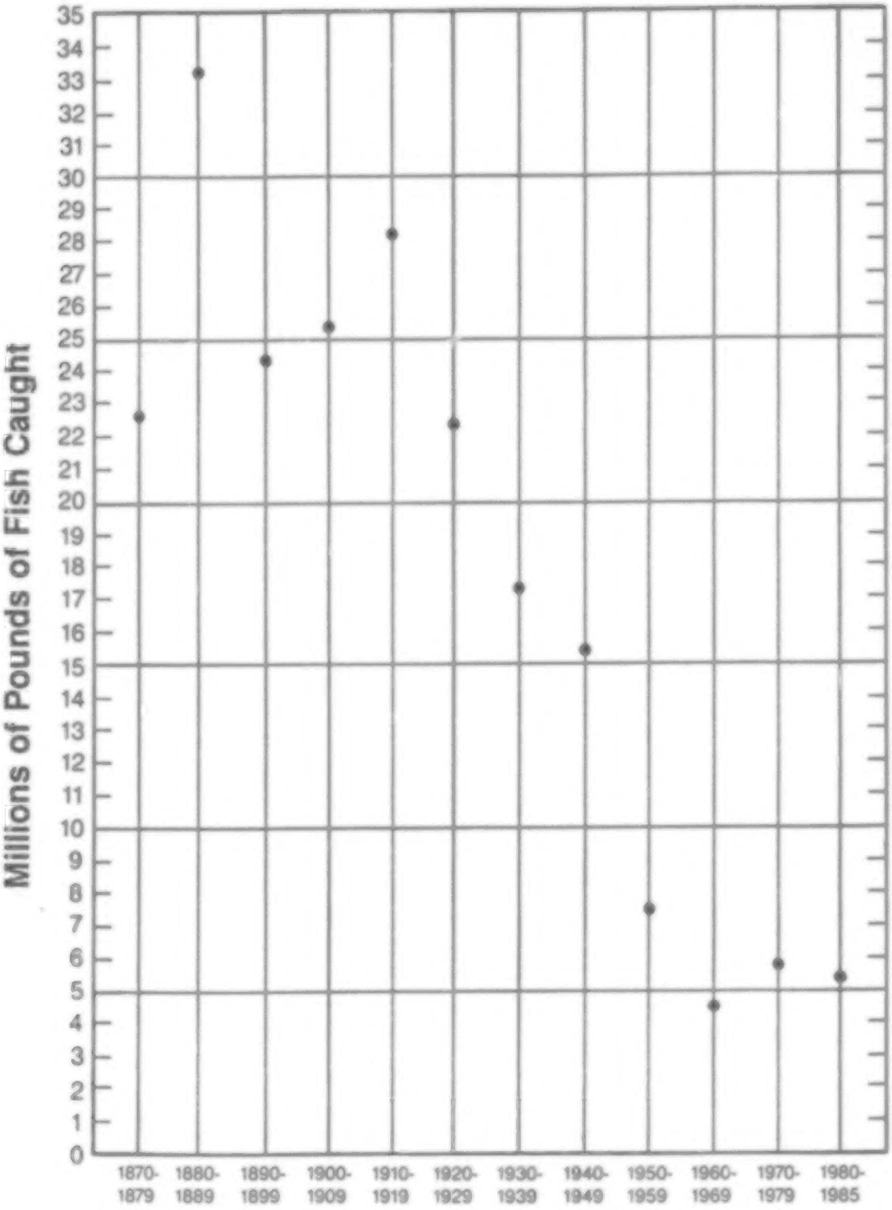
4. Repeat step three with each year of fish #1.

General Relating Skills

- Participate in group activities

Teamwork/ Cooperative Skills

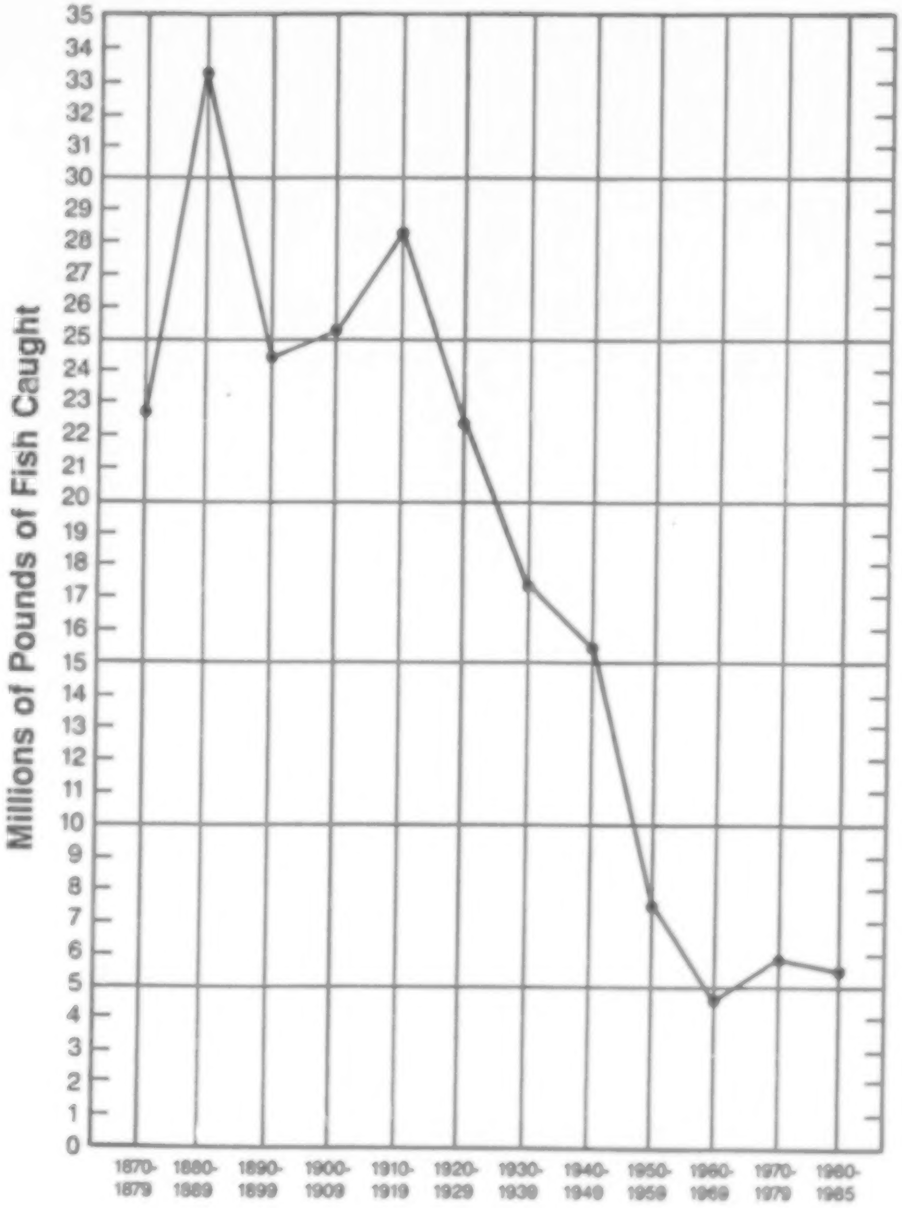
- Give/receive feedback
- Generate ideas



5. Using a colored pencil or chosen kind of line, connect the dots.

Cognitive Activities Skills

- Identify critical elements/issues
- Identify underlying causes
- Analyze/synthesize information
- Apply intuitive thinking techniques



HISTORICAL DATA

1866	Opening of first fish cannery on the river.
1869-1883	Canning of Fish 1 jumped from 100,000 cases to 630,000 cases.
1880-1889	43 million pounds of Fish 1 taken from river by commercial fishers.
After 1883	Canneries begin to use other species of fish 2, 3, 4, 5.
1877-1878	First efforts to regulate fisheries by state. Enforcement was limited but control of amount and type of fishing gear helped.
1900-1909	30 million pounds of all fish taken.
1915-1920	40-44 million pounds of fish taken as World War I inspired intensive use.
1920	Approximately 1,000 commercial trollers operating in ocean. At least that many boats in the river with gill nets, seines, and traps.
1933-1938	Construction of first dam on lower part of the river.
After 1935	Only gillnetters allowed on the river. All other commercial fishing techniques banned.
1941	Second dam built in upper river. No fish ladders installed.
1940-1950	Four new dams built on the river between existing dams.
1930-1950s	Extensive logging in lowest part of river systems.
1950s	Six dams built on the major tributary of the river.
1950s	Government launches a massive hatchery program for Fish 1, 2, and 5.
1953	Another dam built on main river.
1957	Another dam built.
1950-1960s	Ocean harvest rather than river harvest of Fish 1 and 2 increases greatly.
1968	Another dam built.
1968-1973	Extreme nitrogen supersaturation in river from dam spill of runoff water. Many small fish killed.
1960-1980	Fish hatchery techniques greatly improved on Fish 1, 2, and 5.
1970s	Commercial use of Fish 5 is banned.
1980s	Intensive regulation of ocean fishing on Fish 1 and Fish 2.

YEARS	FISH 1	FISH 2	FISH 3	FISH 4	FISH 5
1870-79	22.7	–	–	–	–
1880-89	33.1	–	–	–	–
1890-99	24.1	3.2	0.8	2.4	3.0
1900-09	25.1	2.1	1.3	0.8	0.7
1910-19	28.1	4.3	3.6	0.9	1.9
1920-29	22.3	5.5	3.1	0.9	2.5
1930-39	17.2	3.2	1.2	0.3	1.9
1940-49	15.4	1.1	1.5	0.2	1.8
1950-59	7.4	0.6	0.2	0.3	1.1
1960-69	4.7	1.6	0.02	0.1	0.6
1970-79	5.9	1.9	0.01	0.2	0.4
1980-89*	5.4	1.9	0.01	0.06	0.3

*projected

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Fish 1 (Chinook): Considered to be the most abundant and valued fish species for catching. They migrate the entire length of the river. Largest in individual size of all fish.

Fish 2 (Coho): These fish are second to Fish 1 in popularity and economic value. They migrate only up to the lower middle part of the river system.

Fish 3 (Chum): Never popular. Do not bite a hook well. Found only near the mouth of the river. Usually caught with nets.

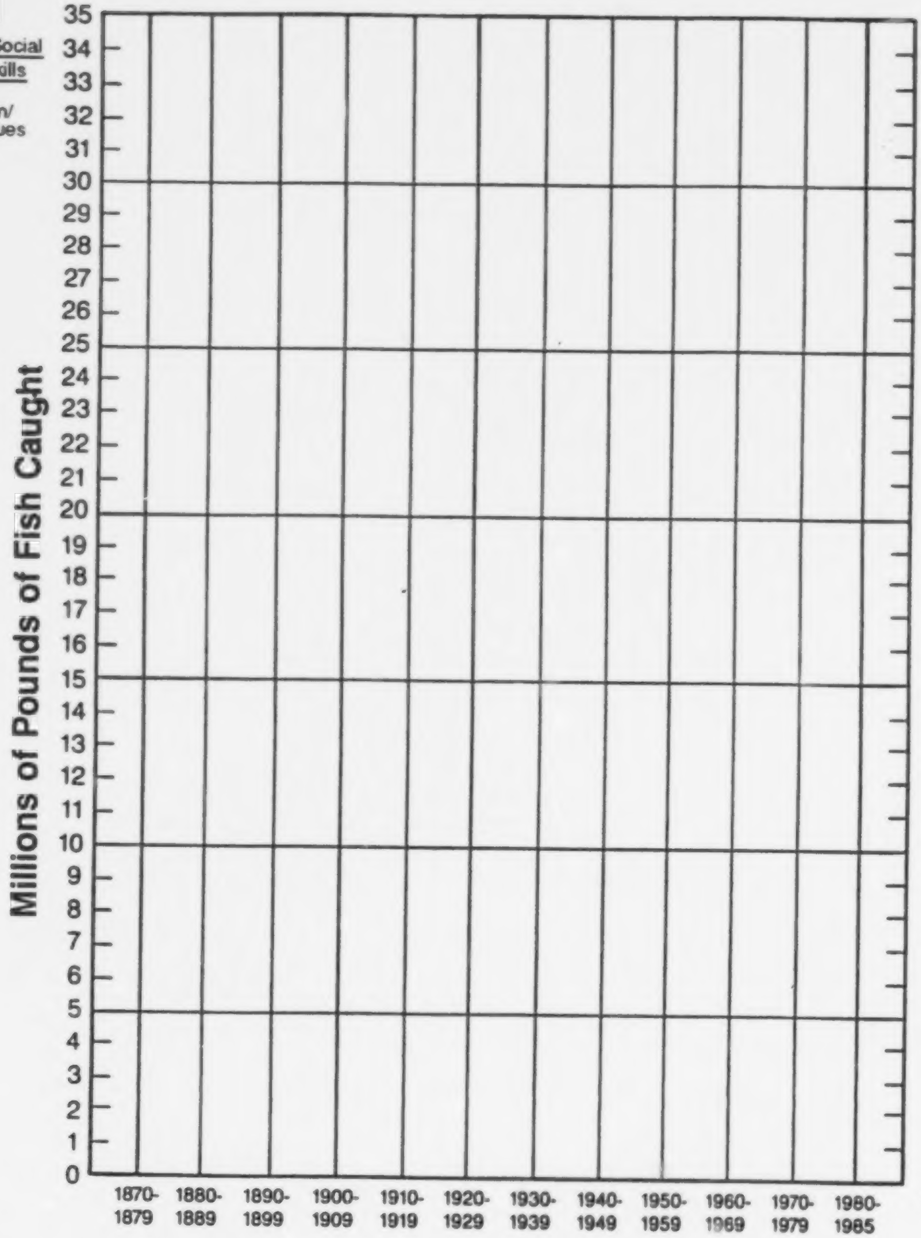
Fish 4 (Sockeye): Smallest-sized fish in the group. They migrate to the uppermost part of the river. They require lakes for successful spawning and rearing. Do not bite well. Taken mostly with nets.

Fish 5 (Steelhead): These fish migrate throughout the river system. Habitat requirements are more restrictive than others.

Functional Social Studies Skills

- Analyze conservation/ ecology issues

6. Repeat steps 3 - 5 for fish #2 - #5, using a different color pencil or kind of line for each.



7. Using your graph, discuss the following questions with your classmates.

NOTE: Even with graphing, people will not always agree on what causes changes. Some changes to the environment will cause sudden changes; some will take more time to occur.

Questions for Discussion

1. When did some of the most sudden changes occur?
2. When did some more gradual changes occur?
3. What caused these changes?
4. What overall trends are evident?
5. Which species are most stable?
6. Which species are least stable?
7. What relationships do you find between species?

ASSIGNMENT SHEET 2

Development of:
READING SKILLS
SCIENCE SKILLS
CREATIVE THINKING SKILLS
PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading, science, and creative thinking and problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Selecting useful resources
  - Locating resources
  - Finding materials in library
  - Using standard references

  SCIENCE SKILLS

  - Investigating conservation of living resources

  CREATIVE THINKING AND PROBLEM SOLVING SKILLS

  - Collecting/recording information

- If students have difficulty using standard references, review the basic procedures for using an encyclopedia, an index, or other references used in this assignment.

- For additional suggestions on teaching basic skills, refer to the Instructional Supplement 3.

ASSIGNMENT SHEET 2

NATURAL RESOURCES— WILDLIFE AND FISHERIES

XV

Name ______________________ Score __________

OBJECTIVE 10

Make a chart on fish found in your area.

INTRODUCTION

Some fish and shellfish, such as shrimp and trout, are commercially grown in areas where they are not found naturally. Most species found in nature are limited to areas where the climate and temperature range provide a good environment for them. Find out what types of fish thrive in your area and how they are used.

DIRECTIONS

Contact local bait shops, fishing clubs, park rangers or the Oklahoma Department of Wildlife Conservation, 1801 North Lincoln, Oklahoma City, Oklahoma 73152. Ask for the types of fish that grow in your area. Use encyclopedias or other references to complete the information in the chart below.

Fish	Average Size	Uses	Other Information

Research and Reference Skills

- Select useful resources
- Locate resources
- Find materials in library
- Use standard references

Earth Science Skills

- Investigate conservation of living resources

Cognitive Activities Skills

- Collect/record information

ASSIGNMENT SHEET 3

Development of:
MATHEMATICS SKILLS
SCIENCE SKILLS
SOCIAL STUDIES SKILLS

- Introduce the assignment to the students by discussing why mathematics, science, and social studies skills are important.

- Discuss with them the following skills which are relevant to this task:

  MATHEMATICS SKILLS

  - Rounding off numbers
  - Solving numerical expressions
  - Calculating with whole numbers
  - Solving word problems
  - Selecting/applying mathematical procedure

  SCIENCE SKILLS

  - Investigating food chains, webs, pyramids
  - Investigating conservation of living resources
  - Investigating issues of environmental impact

  SOCIAL STUDIES SKILLS

  - Analyzing conservation/ecology issues

- If students have difficulty rounding off numbers, review the basic skills for rounding off numbers.

  EXAMPLE: If a decimal number is 5 or more, change the digit to its left to the next higher number. If the number is 4 or less leave the number to the left as it is.

- If students have difficulty calculating with whole numbers, review basic addition, subtraction, multiplication and division.

- If students have difficulty solving word problems or practical problems, instruct them to find the key elements of the problem.

- If students have difficulty selecting and applying math formulas, instruct the students to reword the problem in a form that is clearer to them.

  EXAMPLE: Convert 20 inches to centimeters.
  Reword: If there are 2.5 centimeters in one inch, how many centimeters are there in 20 inches?

- If students have difficulty investigating food chains, webs, and pyramids, present an example that students are familiar with.

- For additional suggestions on teaching basic skills, refer to the Instructional Supplement for Assignment Sheet 1.

ASSIGNMENT SHEET 3

NATURAL RESOURCES—WILDLIFE AND FISHERIES

XV

Name ______________________________ Score ____________

OBJECTIVE 11 **Calculate the amount of forage required to support the number of animals needed to feed one mountain lion for a year.**

INTRODUCTION Predators like foxes, bears, and coyotes have been hunted and killed, often to the point of endangerment and extinction. Sometimes they pose danger to humans, they occasionally kill livestock but they play an important role in the food chain by limiting prey populations. Just how much do these predators eat? Use the assignment to discover how their appetite affects the ecosystem around them.

DIRECTIONS Use this information to solve the questions below. Round all answers to the nearest whole number.

One mountain lion can eat approximately 1,095 pounds (490 kilograms) of venison (deer meat) each year. In addition, it eats rabbits, porcupines, and other small animals.

One deer eats about 3,650 pounds of vegetation (grasses, herbs, brush, and tree leaves) each year.

One square mile of deer habitat produces 800 pounds of vegetation that deer will eat each year.

NOTE: These figures are averages. Actual amounts of vegetation produced and eaten depends upon the area, climate, plants grown, and many other factors.

1. How many square miles of deer habitat are needed to produce the vegetation necessary to support one deer?

____

Operation and Calculation Skills
- Round off numbers
- Calculate with whole numbers
- Solve numerical expressions

Math Application Skills
- Solve word problems
- Select/apply mathematical procedure

Life Science Skills
- Investigate food chains, webs, pyramids

Earth Science Skills
- Investigate conservation of living resources
- Investigate issues of environmental impact

Functional Social Studies Skills
- Analyze conservation/ ecology issues

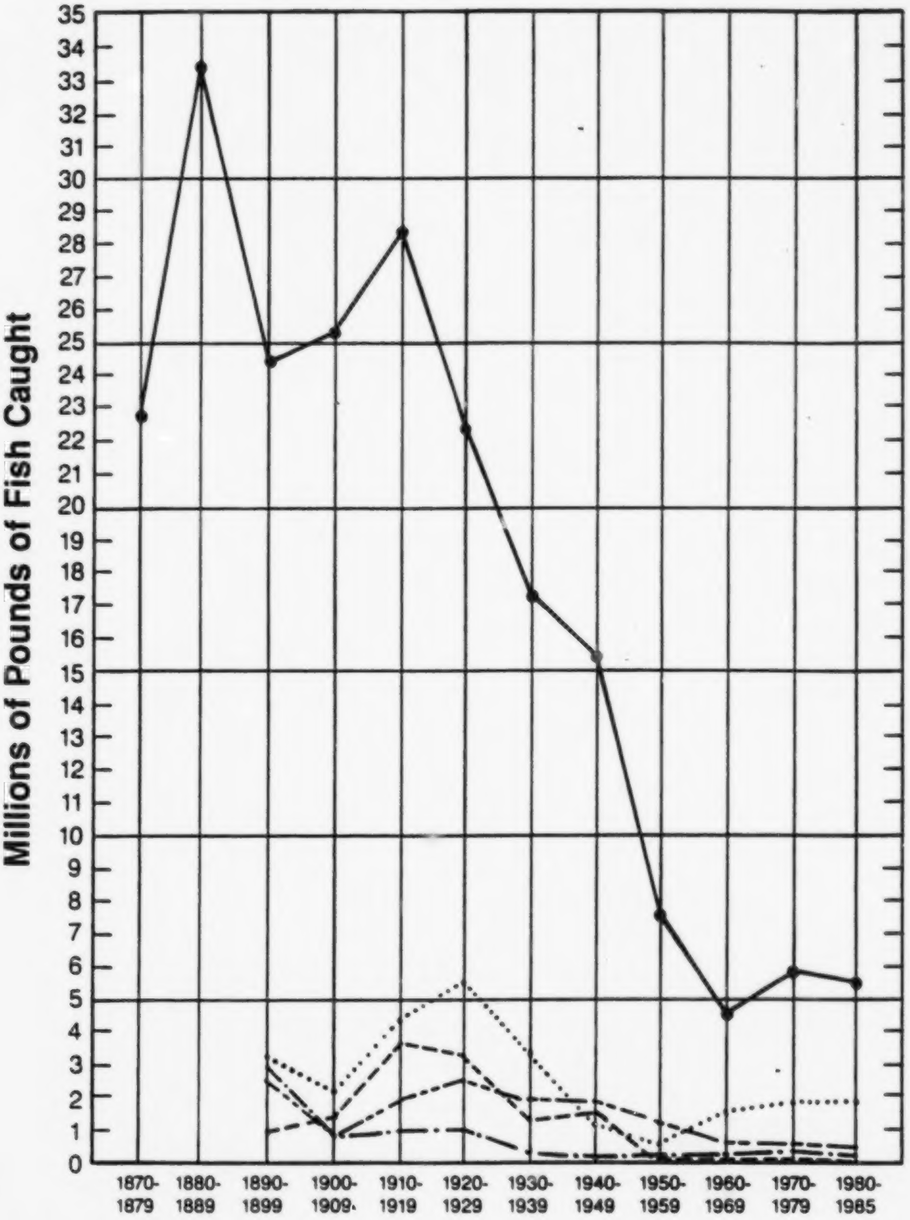
2. If each deer killed weighs 150 pounds, how many deer would be necessary to support one mountain lion for one year?

____

3. How many square miles of deer habitat are necessary to support one mountain lion for a year?

____

ASSIGNMENT SHEET 1



ASSIGNMENT SHEET 2

Information should be accurate according to fish and wildlife information.

ASSIGNMENT SHEET 3

1. 5 (3650 ÷ 800 = 4.5625 rounds to 5)
2. 7 (1095 ÷ 150 = 7.3 round to 7)
3. 35 (5 X 7 = 35)

1066

WRITTEN TEST

NATURAL RESOURCES— WILDLIFE AND FISHERIES

XV

Name ________________________ Score ____________

OBJECTIVE 1

Match terms associated with wildlife and fisheries to their definitions. Write the correct letter in the blank.

_____ 1. A place where fish are caught; the business of catching, packaging, and selling fish and seafood

_____ 2. To move from one area to another

_____ 3. In danger of becoming extinct

_____ 4. A business in which fish are raised and sold

_____ 5. All wild animals and birds

_____ 6. No longer in existence

_____ 7. Birds or animals hunted for sport or food; hunting is regulated

_____ 8. A portion of a map, graph, or other diagram that lists symbols used and their meanings

_____ 9. Artificial body parts

_____ 10. Raising fish and underwater plants for sale and profit

_____ 11. Birds and animals which are not trapped or hunted; hunting is prohibited

_____ 12. Suffering reduced populations

a. aquaculture
b. endangered
c. extinct
d. hydroponics
e. fish farm
f. fishery
g. baitfish
h. game
i. legend
j. subsistence
k. table
l. migrate
m. nongame
n. prosthetics
o. protectable
p. roam
q. threatened
r. wildlife

May be photocopied for student use.

OBJECTIVE 2

1. **Discuss the value of wildlife protection.** Describe two reasons why wildlife protection is important.

____
____
____
____
____
____

2. Why do you think wildlife is important?

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OBJECTIVE 3

Select from a list true statements about endangered species. Write an "X" in the blank before each true statement.

_____ 1. Most species have been endangered by overhunting, disease, and evolutionary changes.

_____ 2. Nobody knows how many animals are extinct.

_____ 3. In 1973, the American government began to catalog endangered and extinct animals.

_____ 4. A clear count of the number of species alive is available.

_____ 5. In 1862, the American government began to catalog endangered and extinct animals.

_____ 6. Independent groups have designated over 4,500 animal species as endangered.

1063

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_____ 7. Most species have been endangered by habitat destruction, pollution, or diversion of water.

_____ 8. The U.S. Fish and Wildlife Service has designated 1,000 species as endangered.

_____ 9. Independent groups have designated as many as 500 animal species as endangered.

_____ 10. Only five species have increased their population enough to be removed from the endangered list.

_____ 11. Funds become available for protection and research when an animal is nominated for the endangered species list.

OBJECTIVE 4

Choose the word or phrase that completes statements about fisheries and the fishing industry. Write the correct letter in the blank.

_____ 1. Fishing is a very

a. old industry
b. American industry; it's not found elsewhere in the world
c. slowly growing industry
d. new industry

_____ 2. Many consumers are buying and eating more fish because of its

a. price
b. extensive advertising campaigns
c. health benefits
d. improved flavors

_____ 3. In coastal regions, fishing boats and crews catch large numbers of fish and seafood by using

a. poles and traps
b. poles and netting systems
c. netting systems
d. netting systems and traps

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____ 4. Sport fishing in Oklahoma does all of the following **EXCEPT**

a. bring tourists to Oklahoma
b. compete with a large commercial fishing industry
c. support a large bait and tackle manufacturing industry
d. support the many public and private fishing lakes and ponds in Oklahoma

____ 5. The fastest-growing alternative agriculture in the nation is

a. sport fishing
b. off-shore commercial fishing
c. fish processing and packaging
d. fish raising

____ 6. Fish most frequently grown in Oklahoma include tilapia, channel catfish, frogs, striped bass, bait fish such as shiners and minnows and sport fish such as

a. bass and bluegill
b. crawfish and bluegill
c. marlin and crawfish
d. marlin and bass

____ 7. Production must be kept low when fish farming with a cage system or water will become

a. polluted
b. overcrowded
c. deoxygenated
d. cloudy

____ 8. Ponds used for pond culture should be

a. at least 3 acres in area
b. must be at least 80 feet deep
c. specially made and specially lined
d. specially built with flat-bottoms

____ 9. Continuous flow systems include ponds, tanks, or other containers through which

a. air continuously flows
b. new water continuously flows
c. the fish continuously circulate
d. food pellets continuously flow

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_____ 10. Although recirculating systems are still considered experimental, they are thought to be

a. unusable
b. unprofitable
c. the system of the future
d. the best method available

OBJECTIVE 5 **Select from a list true statements about the co-existence of animals and technology.** Write an "X" in the blank before each true statement.

_____ 1. Technology is used only to make wildlife profitable.

_____ 2. Construction technology today is designed and operated with wildlife in mind.

_____ 3. When the Alaskan pipeline was built, caribou were surrounded by the pipeline and trapped.

_____ 4. When many large dams were built in the northwestern United States, it was important that salmon not be cut off from the spawning grounds.

_____ 5. Fish ladders are a series of lift buckets that catch and carry fish over a dam.

_____ 6. Wildlife have adapted to technology, rather than technology adapting to wildlife.

_____ 7. When the Alaskan pipeline was built, it blocked caribou migration paths.

_____ 8. Fish ladders are gradually inclining troughs of water beside a dam that allow fish to swim upstream without being harmed.

_____ 9. Technology and new scientific methods allow us to learn more about the air, water, and soil around us, to test and monitor it more carefully, and to learn how to clean and protect it.

_____ 10. Wild animals needing surgery must be killed.

_____ 11. Radio transmitters and video monitoring devices help scientists trace the movement and habits of many species of wildlife.

_____ 12. By using plastic surgery and prosthetics, birds injured in the wild have been fitted with false legs and beaks.

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OBJECTIVE 6

Choose the word or phrase that completes statements about zoos. Write the correct letter in the blank.

_____ 1. Zoos have been in use for

a. the last twenty years
b. the last one hundred years
c. the last one thousand years
d. more than one thousand years

_____ 2. In the past, zoos were little more than displays of exotic animals. Animals were caged or housed in displays that were

a. much the same as we would find in a zoo today
b. nothing like their native habitats
c. re-creation of their native habitats
d. moveable

_____ 3. In today's zoos, lighting, food, temperature, and plants are

a. as close to the natural environment as possible
b. usually man-made
c. much as they were in the past
d. not carefully controlled

_____ 4. In modern zoos, endangered species can be

a. identified
b. monitored
c. separated
d. protected

OBJECTIVE 7

Choose the word or phrase that completes statements about the forage industry. Write the correct letter in the blank.

_____ 1. Oklahoma was once part of the

a. Great Salt Plains
b. Western Forest Region
c. Great Forest
d. Great Plains

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_____ 2. Four forces that formed Oklahoma's native environment are climate, drought, fire, and

a. rain
b. migration
c. grazing
d. tornados

_____ 3. When the natural cycles were disturbed, some of the native grasses

a. did not return
b. grew back
c. destroyed crops
d. mutated

OBJECTIVE 8 **List negative effects of wildlife.** Write four negative effects in the space below.

1. ______________________________
____
2. ______________________________
____
3. ______________________________
____
4. ______________________________

NOTE: Objectives 9-11 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

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WRITTEN TEST ANSWERS

NATURAL RESOURCES–WILDLIFE AND FISHERIES

XV

OBJECTIVE 1

1. f
2. l
3. b
4. e
5. r
6. c
7. h
8. i
9. n
10. a
11. m
12. q

OBJECTIVE 2

1. Answers should include any two of the following:
    - Stewardship
    - Cultural and recreational needs
    - Ecosystem protection
    - New technological uses of animals and animal products
    - Protection of related species
    - Economics and related industries
    - Use as early-warning system for environmental dangers
2. All opinions should be supported with accurate information.

OBJECTIVE 3

2, 3, 6, 7, 8, 10, 11

OBJECTIVE 4

1. a
2. c
3. d
4. b
5. d
6. a
7. c
8. d
9. b
10. c

OBJECTIVE 5

2, 4, 7, 8, 9, 11, 12

OBJECTIVE 6

1. d
2. b
3. a
4. d

OBJECTIVE 7

1. d
2. c
3. a

OBJECTIVE 8

Answers should include any four of the following:

- Damage to crops and other plants
- Killing livestock and other domesticated animals
- Danger to people
- Competition with other animals for food, water, and other necessities
- The spread of disease

EIGHTH-GRADE AGRICULTURAL ORIENTATION

CI

	READING SKILLS																								WRITI											
	[illegible] Comprehension									Research and Reference								Functional Reading						Language		Composition								Resear		
UNITS OF INSTRUCTION STATE/LOCAL CODES*	Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques	Select useful resources	Locate resources	Find materials in library	Use standard references	Use in-book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers	Interpret forms and records	Follow written instructions	Interpret graphics and symbols	Use content area vocabulary	Interpret abbreviations/acronyms	Read aloud	Use standard grammar and correct spelling, punctuation, and capitalization	State ideas clearly	Use complete sentences	Develop preliminary outline	Use topic sentences	Use introductory/closing paragraphs	Compose reports	Compose essays	Proofread and edit	Construct graphics and symbols	Take notes	Use notecards	Create bibliography
Intro. to Agricultural Industry	●									●	●	●	●				●							●	●									●		
Record Keeping	●														●	●	●	●	●					●		●						●	●	●	●	
Agricultural Communication	●			●				●		●	●	●					●		●					●	●	●						●		●	●	
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Ag Products and Processing	●																●		●						●								●			
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Agricultural Construction																			●	●					●											
Agricultural Sales and Service	●																●		●						●								●			
Ag Ecology and Environment	●							●		●	●	●						●	●						●	●								●		
Natural Res–Parks & Rec	●																●			●				●	●					●			●	●		
Natural Res–Wildlf & Fish										●	●	●	●						●	●																
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MC BASIC SKILLS DOCUMENTATIO

NG SKILLS

MATH SKILLS

th	Functional Writing							Operation and Calculation														Math Application											Data Analysis and Display													
Outline material	Complete forms and records	Write instructions	Write letters	Write job applications	Write resumes	Use word processing	Use computer graphics	Round off numbers	Estimate answers	Use scientific notations	Use exponential notations	Calculate with whole numbers	Calculate with fractions	Calculate with decimals	Convert whole numbers to fractions	Convert whole numbers to decimals	Solve numerical expressions	Solve formulae and equations	Obtain squares and square roots	Convert units of measure	Perform metric calculations	Solve word problems	Select/apply mathematical formula	Select/apply mathematical procedure	Use English and metric measures	Solve time/rate/distance problems	Solve ratio/proportion problems	Solve percent problems	Apply techniques of scaling	Apply algebra principles	Apply geometry principles	Apply trigonometry principles	Interpret charts and tables	Interpret graphs (type)	Collect/record data	Apply sampling techniques	Apply principles of probability	Construct charts and tables	Construct graphs	Calculate statistics	Interpret statistics	Interpret blueprints/plans	Make measurements	Perform banking transactions	Make change	Solve practical problems
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N MATRIX

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Stillwater, Oklahoma 74074-4364

SCIENCE SKILLS

94-010383

Functional Math										General Science									Life Science							Physical Science					Earth Science							
Calculate gross earnings	Solve income/expense problems	Prepare a budget	Calculate interest	Solve interest problems	Calculate sales tax	Determine income tax	Use calculator for computation	Use computer for computation	Use computer spreadsheets	Apply computing skills	Apply scientific method of inquiry	Conduct experiments	Investigate science ethics	Investigate science history	Investigate/apply economics in technology	Use scientific instruments	Investigate/apply technology	Collect specimens	Identify/classify living organisms	Investigate biological history of the earth	Investigate food chains, webs, pyramids	Investigate/apply principles of human development	Investigate/apply principles of genetics/heredity	Investigate/apply principles of anatomy/physiology	Investigate health issues	Analyze/classify matter	Investigate forms/changes of matter	Investigate forms/changes of energy	Investigate/apply chemical properties	Investigate/apply physical laws	Investigate physical characteristics of the earth	Investigate geological history of the earth	Investigate physical forces acting on the earth	Solve problems of longitude, latitude, and time zones	Investigate conservation of physical resources	Investigate conservation of living resources	Investigate issues of environmental impact	Apply science principles to environmental issues
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BEST COPY AVAILABLE

	ORAL COMMUNICATIONS SKILLS																						INTERPERSON.																
	Oral Presentation									Listening				Interactive Communication										General Relations																
UNITS OF INSTRUCTION STATE/LOCAL CODES*	Make informative presentations	Make persuasive presentations	Present personal opinion/viewpoint	Use good speaking techniques	Select/use words effectively	Use effective body language	Present appropriate appearance	Integrate audio and/or visual materials in oral presentations	Adapt presentation to specific audience	Apply active listening skills	Distinguish fact, opinion, and interference	Draw conclusions/make generalizations	Analyze/identify point of view	Give/follow oral directions	Apply questioning techniques	Conduct/receive interviews	Analyze/apply nonverbal communication	Work effectively in a group	Communicate with clients/customers/patients	Communicate with co workers	Communicate with supervisors	Communicate with professional colleagues/associates	Apply telephone etiquette	Investigate/apply communication process models	Analyze/apply nonverbal communication	Investigate/apply cross-cultural communication	Interact with co workers	Interact with supervisors	Interact with clients/customers/patients	Interact with professional colleagues/associates	Interact with family/friends	Participate in group activities	Participate in industrial relations/functions	Identify personal values/attitudes	Apply information to life experiences	Identify values/attitudes	Identify needs/drives	Select/apply appropriate behavior	Investigate/identify personal styles	Investigate/identify group/
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Ag Ecology and Environment		●	●							●								●														●								
Natural Res-Parks & Rec										●																				●		●								
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Developer of the Natio

AL OR RELATING SKILLS																		CREATIVE THINKING/ PROBLEM SOLVING SKILLS																				EMI							
Teamwork Cooperation											Leadership Influence							Cognitive Activities																				Job Search Selection							
corporate climate	Give/receive feedback	Identify hidden purposes	Investigate/apply group dynamics	Control undesirable/inappropriate behavior	Resolve conflicts	Clarify goals/objectives	Devise "win/win" solutions	Build consensus	Generate ideas	Present point of view	Analyze/apply leadership styles	Analyze/apply management styles	Obtain confidence of others	Develop esteem in self/others	Persuade others	Analyze/apply motivation techniques	Provide positive coaching	Collect/record information	Identify critical elements/issues	Define a problem	Identify underlying causes	Apply a problem solving model	Analyze/synthesize information	Identify/analyze underlying assumptions	Draw conclusions	Predict results/outcomes	Identify/evaluate consequences	Identify/develop alternatives	Evaluate alternatives	Select an alternative	Devise a solution	Create a finished product	Apply intuitive/creative thinking processes	Transfer knowledge/training to new situations	Apply new technology	Develop an action plan	Evaluate results/outcomes	Analyze personal occupational aptitudes/preferences	Investigate employment prospects of a career field/occupation	Investigate training requirements for a career field/occupation	Investigate benefits of a career field/occupation	Compare/evaluate career options	Develop personal career path	Locate appropriate jobs	Analyze duties/requirements/benefits of specific job
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n's Best Competency-Based Instructional Systems for

OYABILITY SKILLS

SOCIAL STUDIES SKILLS

Job Acquisition Development														Information Analysis						Social Studies Application										Functional Social Studies														
Master specific job task/procedure	Fill in job related applications	Write letter of application	Write personal resume	Interview for a job	Apply business etiquette	Practice good work habits/attitudes	Develop good personal presentation	Develop self confidence/esteem	Develop effective leadership	Deal effectively with supervisors	Deal effectively with co workers	Deal effectively with professional colleagues/associates	Deal effectively with customers/clients	Collect/record data	Interpret graphical information	Construct graphical information	Interpret maps/globes	Interpret statistical information	Analyze/interpret demographic information	Investigate/apply U S history	Investigate/apply world history	Investigate/apply U S geography	Investigate/apply world geography	Investigate/apply principles of government/politics	Investigate/apply principles of economics	Investigate/apply principles of ethics	Investigate/apply principles of psychology	Investigate/apply principles of sociology	Investigate/apply cross cultural studies	Practice responsible personal economics	Prepare a personal budget	Use credit responsibly	Practice good work ethics	Participate in industrial relations	Interact with people of different races/cultures	Investigate/participate in government	Investigate/apply American legal practices	Select/use sources of information on current events	Analyze current events	Analyze consumer issues	Analyze social issues	Analyze conservation/ecology issues	Analyze social impact of science/technology	Analyze economic impact of science/technology
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